

# CORNELL UNIVERSITY OFFICIAL PUBLICATION

Volume XXIV

Number 16

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## Announcement of the College of Arts and Sciences for 1933-34

Ithaca, New York  
Published by the University  
April 1, 1933

## THE UNIVERSITY CALENDAR FOR 1933-34

1933

### FIRST TERM

Sept. 18, <i>Monday</i> ,	Entrance examinations begin.
Sept. 25, <i>Monday</i> ,	{ Registration and assignment of new students.
Sept. 26, <i>Tuesday</i> ,	
Sept. 26, <i>Tuesday</i> ,	{ Registration and assignment of old students.
Sept. 27, <i>Wednesday</i> ,	
Sept. 28, <i>Thursday</i> ,	Instruction begins at 8 A.M.
Oct. 20, <i>Friday</i> ,	Last day for payment of tuition for the first term.
Nov. 29, <i>Wednesday</i> ,	Instruction ends at 6 P.M. { Thanksgiving
Dec. 4, <i>Monday</i> ,	Instruction resumed at 8 A.M. { Recess
Dec. 23, <i>Saturday</i> ,	Instruction ends at 1 P.M. { Christmas
1934	{ Recess
Jan. 8, <i>Monday</i> ,	
Jan. 11, <i>Thursday</i> ,	Instruction resumed at 8 A.M. {
Jan. 27, <i>Saturday</i> ,	Founder's Day.
Jan. 29, <i>Monday</i> ,	Instruction ends.
Feb. 7, <i>Wednesday</i> ,	Term examinations begin.
Feb. 8, <i>Thursday</i> ,	Term ends.
	A holiday.

### SECOND TERM

Feb. 9, <i>Friday</i> ,	Registration of all students.
Feb. 12, <i>Monday</i> ,	Instruction begins at 8 A.M.
Mar. 5, <i>Monday</i> ,	Last day for payment of tuition for the second term.
Mar. 31, <i>Saturday</i> ,	Instruction ends at 1 P.M. { Spring
April 9, <i>Monday</i> ,	Instruction resumed at 8 A.M. { Recess
May 26, <i>Saturday</i> ,	Spring Day: a holiday
June 4, <i>Monday</i> ,	Term examinations begin.
June 12, <i>Tuesday</i> ,	End of term examinations.
June 18, <i>Monday</i> ,	COMMENCEMENT.

# COLLEGE OF ARTS AND SCIENCES

## FACULTY

- LIVINGSTON FARRAND, A.B., M.D., L.H.D., LL.D., President of the University.  
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## COURSES AND REQUIREMENTS

Regarding admission to the College of Arts and Sciences, the General Information Number should be consulted.

Two courses are offered in the College of Arts and Sciences, one leading to the degree of Bachelor of Arts, the other leading to the degree of Bachelor of Chemistry.

Neither degree will be conferred upon any student who has not been in residence at Cornell University during the last two terms preceding graduation, nor upon any student who has not been in residence at least two terms in this College, and in this College only.

For the degree of Chemical Engineer, see p. 19.

A student who does not pass twelve hours in any term, with a grade of 70 or better in at least six of the twelve hours, will be either dropped or placed upon probation. The same penalties may be imposed on students of this College who, having registered in the Summer Session, do not pass four hours of their Summer Session registration with a grade of 70 or better in at least two hours.

A student's general record may be so unsatisfactory that the Faculty will refuse him permission to continue in the College even though he has passed twelve hours in the preceding term.

A student failing in the last term, or summer session, of his senior year to meet the requirement in hours and grades which is described above, will ordinarily be expected to return for another term, or summer session, wherein he will be held to make a satisfactory record before he will be graduated.

## REGISTRATION

Students will file their study cards at the office of the Dean in accordance with instructions issued at the time of registration.

With the consent of the Dean and the approval of his adviser, a student may alter his list of courses during the first six days of instruction. Thereafter, no student will be permitted to cancel his registration for any course in which he is registered, unless he shall previously have obtained from the Dean authorization to do so on the ground of ill health, or for other reasons beyond the student's control.

## THE GEORGE C. BOLDT MEMORIAL SCHOLARSHIPS

Mr. George C. Boldt, jr., has created three scholarships of the annual value of five hundred dollars each, as a memorial to his father. These scholarships will be awarded at the close of the junior year to

the three male students of the College who shall be considered most deserving of this aid. Applications for these scholarships must be filed in the Office of the Dean before March 15 of the academic year preceding the year for which they are awarded.

### THE CORNELIA L. HALL SCHOLARSHIP

A gift of the late Mary F. Hall has established the Cornelia L. Hall Scholarship, of the annual value of one hundred and fifty dollars, "open to any meritorious young woman of this State, who is pursuing the studies of the A.B. course and who is in need of financial assistance." Under the terms of the bequest preference must be given to a suitable candidate from Tioga, Tompkins, or Chemung County; within this preferred class, women of senior or junior standing will be regarded as entitled to first consideration. Applications for the scholarship must be filed in the Office of the Dean before March 15 of the academic year preceding the year for which it is awarded.

### THE DEGREE OF BACHELOR OF ARTS

#### I. REQUIREMENTS FOR GRADUATION

1. Credit for one hundred and twenty hours, of which at least ninety hours must be for courses given in the College of Arts and Sciences. Military Science 2 and Hygiene 1, 2, 3, 4, and 5 may be counted as part of the thirty hours which a student may elect outside the College of Arts and Sciences, but may not be counted as part of the ninety hours required in the College.

2. A grade of 70 or better in at least sixty of the required one hundred and twenty hours. (See Section IV: Marks.)

3. Election of courses in accordance with Section III, Course of Study.

4. Completion of the work in Hygiene and Preventive Medicine, and in Military Drill or in Physical Training prescribed by the University Faculty (See pages 82-84.)

#### II. SPECIAL PROVISIONS REGARDING CREDITS TOWARD GRADUATION

5. **In Summer Session.** To obtain credit by means of work done in summer sessions, a student must previously have satisfied the entrance requirements of the College, and must obtain in advance the Dean's approval of his selection of courses. Credit for a maximum of thirty hours, but no more, may be secured in this way.

Credit will be allowed, under the same restrictions, for work done in summer sessions of other universities belonging to the Association of American Universities, by a student regularly registered in this College, but permission to offer such credit must be obtained in advance from the Dean of this College.

**6. Admission to Advanced Standing.** A student admitted to the College of Arts and Sciences from another college of Cornell University, or from any other institution of collegiate rank, will receive credit toward the degree of Bachelor of Arts for the number of hours to which his records may, in the judgment of the Faculty, entitle him. In order, however, to obtain the degree of Bachelor of Arts, he must, as a candidate for that degree, have been in residence at least two terms in the College of Arts and Sciences, and in that college only.

Credit toward a degree for work done in a preparatory school, upon subjects (numbers 1-18 inclusive) which may be offered for entrance to the University, may be given only to those students who, in addition to satisfying all entrance requirements, pass separate examinations in the subjects for which they seek college credit. These examinations will cover substantially the same ground as the University courses in the corresponding subjects. An applicant who desires a college credit examination of this kind must apply to the Office of Admissions as early as possible and in no case later than the day preceding the beginning of the entrance examinations, specifying which fifteen units he intends to offer in satisfaction of the entrance requirements, and upon what other entrance subjects he wishes to be examined for college credit.

In case he fails to satisfy the entrance requirements in any one or more of the subjects which he has offered for entrance, but passes the college credit examination in any other subject or subjects, he may use the latter for satisfying the entrance requirements, but in that case he cannot also receive college credit therefor. The college credit examinations will be held on the date set for the entrance examinations in the same subjects, and, unless otherwise arranged, only at Ithaca.

A candidate using No. 19 of the list of University entrance subjects (see Table II, page 8, General Information Number) to make his fifteen units, may not apply for a college credit examination as described above.

**7. Registration in Two Colleges of the University.** A student who has completed at least ninety hours in courses given in the College of Arts and Sciences may, with the permission of the Faculties concerned, be registered both in the College of Arts and Sciences and also in the Medical College or the Law School. (See paragraph 13, division b). It should be noted, however, that admission to the Medical College is closely restricted, and that in recent years the Medical College has been able to grant this privilege of double registration to only a small proportion of the fourth year students of the College of Arts and Sciences who applied and who were formally eligible for it. Students who contemplate obtaining the A.B. and an Engineering degree by a combined six-year course, are urged to consult the Dean's Office.

**8. Registration in the College and in the Graduate School.** A student who has satisfied all the academic requirements for graduation may, with the permission of the Graduate School, register both in the College of Arts and Sciences and in the Graduate School.

### III. COURSE OF STUDY

#### 9. Number of Hours.

A student must register in each term for at least twelve hours of work. No student may register for more than eighteen hours in any

term except by permission of the Dean. A student who has not attained in any academic year a grade of 70 or better in a total of fifteen hours of work will not be permitted to elect more than fifteen hours of work in either term of the subsequent academic year. A student on probation may not register for more than fifteen hours in the term of his probation. For registration in a course not in the College of Arts and Sciences, the permission of the Dean of this College and of the Professor in charge of the course must be obtained. (See also paragraph b under 11 below.)

#### 10. Freshman Advisers.

Freshmen and sophomores are under the jurisdiction of the Advisory Board for Underclassmen. Each freshman will be assigned to a member of the Faculty who will act as his adviser until he has selected his major adviser. (See paragraph a under 13 below.) The function of the freshman adviser is to assist the student in his choice of studies, to advise him during the term regarding his work, and generally to give him friendly counsel. The approval of the study card and the signature of the adviser must be obtained before the study card is filed at the office of the Dean.

#### 11. Courses Open to Freshmen.

a. The following are the courses in the College of Arts and Sciences open to freshmen, except that (1) a student may not register for any of these courses for which he has not satisfied the prerequisites, if any are specified (see announcement under each course); (2) a student may not register for any of these courses for which he has presented an acceptable equivalent at entrance:

Animal Biology 1, 1a, 303

Astronomy 180, 181

Biology A

Botany 1

Chemistry 101, 103, 105, 203, 205, 210, 225, 825, 830

English 3

French 1, 3, 3a, 4a, 4b, 5a, 5b, 6

Geology A, 100, 101, 201, 311

German 1, 1a, 3, 3a, 4, 5, 7, 8

Government 1

Greek 1a, 1b, 2a, 2b

History 1, 21, 61

Italian 1, 4

Latin 1a, 1, 3

Mathematics 1, 2, 3, 4, 5, 15

Music 1 (not open to students offering Music for entrance)

Philosophy A, 2a

Physics 3, 4, 11, 12

Public Speaking 8

Spanish 1, 3, 4, 5, 6

b. Subject to the permission mentioned in paragraph 9, required courses in other colleges in the regular freshman schedule of those colleges may be selected by a freshman in the College of Arts and Sciences, but only after the approval of the Dean of the College and of his adviser has been obtained.

c. Under exceptional circumstances, a freshman may by petition secure permission from the Advisory Board for Underclassmen to take courses (including freshman electives in other colleges) in addition to those allowed under a and b.

## 12. Prescribed Subjects.

Before graduation a student must satisfy a requirement in each of the following four groups:

### 1. *English*, by completing English 3.

This course must be begun in the first year of residence. Students excused from the second term of English 3 may complete the requirement by other courses in English approved by the department, or by Public Speaking 1.

2. *Foreign Languages*, by completing one of the following:—Greek 2a and 2b; Latin 1a; Latin 1; German 4; German 5; German 7; French 4a and 5a; French 6; Spanish 4 and 5; Spanish 6; Italian 4; any more advanced six-hour course in these subjects.

A course in a foreign language must be included in the schedule of courses for the first year of residence.

3. *History*, by completing one of the following:—History 1; History 21; History 42; History 61; History 82 and 83; History 86 and 87.

4. *Laboratory Science*, by completing one of the following:—Animal Biology 1; Astronomy 180 and 181; Biology A; Botany 1; Chemistry 101 and 105; Geology A; Physics 3 and 4.

5. Before graduation a student must also satisfy a requirement in one subject selected from the following: (a) *Philosophy and Psychology* (including Educational Psychology), by completing six hours of courses in either of these subjects; (b) *Economics and Government*, by completing Economics 1; or Economics 2a and 2b; or Economics 50a and 50b; or any six hours of courses in Government; (c) *Mathematics*, by completing six hours of courses in the subject.

## 13. Major Subject.

a. *Selection of major subject and adviser.* After the first year of residence and before registering for the first term of the third year, a student must select his major subject from the list below. He must at the same time select as major adviser a professor or assistant professor from the department representing his major subject. During the remainder of his residence he will consult with his major adviser in arranging his course and must obtain his signature to the study card before filing it in the Dean's office.

Animal Biology	Government
Astronomy	History
Botany	Mathematics
Chemistry	Music
The Classics	Philosophy
Comparative Study of	Physics
Literature	Psychology
Economics	Public Speaking
Education	Romance Languages
English	Scandinavian Languages
Geology	and Literatures
German	

b. *Major Requirements.* Before graduation, a student must complete courses in satisfaction of the requirement in his major subject. A statement of this requirement, indicating courses and total hours required, appears before the list of courses in each of the major subjects. He must also complete courses in satisfaction of a requirement in related subjects. A statement of this requirement, with a list of courses from which selection is to be made, appears at the same place. Selection of courses to be offered in satisfaction of these requirements is subject to the restriction that twenty-four hours of the total must be chosen from courses not marked by asterisks. If a comprehensive examination is included in the requirements of the major subject, this must be passed before graduation.

Courses completed before the selection of the major subject, including those offered in satisfaction of requirements in prescribed subjects, may be accepted in satisfaction of these requirements.

Upon recommendation of the major adviser, the Dean may excuse a student registered in this College and in another college of the University from not more than eighteen hours of his major requirements.

#### 14. **Informal Study.**

The major requirements in certain subjects may be satisfied in part by informal study. A statement to this effect appears before the list of courses in those subjects in which informal study is arranged. Departments may require informal study of some or all of their major students, or may admit them to it upon application.

Informal study will consist of readings, reports, experimentation, senior theses, or other work intended to require from the student the expression of initiative in his major subject or in a related field approved by his adviser. This work will be supervised by the major adviser or by a member of the instructing staff approved by him, and may be tested by examination at the option of the department.

A student who has credit for sixty hours of courses is eligible for informal study. He may earn credit by this means to the amount of six hours in the junior year, and of twelve hours in the senior year.

## IV. MARKS

15. The passing grade is 60; *abs* represents a course left incomplete by a student's absence from the final examination; *inc* represents a course left incomplete for other reasons acceptable to the instructor; *z*, a course dropped without official cancellation.

16. No credit towards graduation will be given for a course in which a mark of less than 60 or a mark of *z* is recorded, unless the course be repeated and a passing mark received. A student who has received a mark between 40 and 59, inclusive, in any course that is a prerequisite of another course may, at the discretion of the department concerned, be regarded as having satisfied the prerequisite; or the department concerned may, before regarding him as having satisfied the prerequisite, require him, by re-examination or otherwise, to secure a passing grade.

17. A student who, in any course, has received a term mark of "incomplete" or of "absent" may, with the consent of the Dean, and upon payment of the fee required by the University, be permitted to remove the mark, by examination or otherwise, as the department concerned may direct. A mark of incomplete or of absent may not be removed later than registration day of the third term of attendance in the University, dating from the time the course was taken in class, and no more than one attempt at removal will be allowed.

## BACHELOR OF ARTS WITH HONORS

The degree of Bachelor of Arts or Bachelor of Chemistry with Honors in the field of a student's major subject will be conferred upon those students who, in addition to having completed the requirements for the degree of Bachelor of Arts or Bachelor of Chemistry shall (1) have received a grade of 85 or better in at least half of the courses for which they have been enrolled and an average of 85 in the courses for which they have been enrolled in the field of their major subject and its related courses; (2) have, at the option of the department, taken and passed with distinction a comprehensive examination in the major subject; (3) have been recommended for the said degree by the department representing their major subject.

The degree of Bachelor of Arts with Honors in General Studies will be conferred upon those students who, in addition to having completed the requirements for the degree Bachelor of Arts, shall (1) have received the grade of 85 or better in at least ninety hours of courses, and of 92 or better in at least sixty of these; (2) have received a grade of 65 in not more than one course; (3) have received no marks lower than 60. To qualify for the degree of Bachelor of Arts with Honors in General Studies, a candidate must have completed at least sixty hours at Cornell in courses taught in the College of Arts and Sciences; and if he has received credit towards his degree for work done in another institution, the requirement of grades shall be pro-rated for the residue of work which must be completed in Arts and Sciences at Cornell.



## THE DEGREE OF BACHELOR OF CHEMISTRY

The degree of Bachelor of Chemistry will be awarded to those who have satisfactorily completed either of the following curricula, and the requirements prescribed by the University in Hygiene and Preventive Medicine and in Military Drill or in Physical Training. The completion of Curriculum No. 2, or its substantial equivalent, is required for admission to the fifth year of study leading to the degree of Chemical Engineer (see page 19). Since the first two years of work are identical in the two curricula, the student is afforded ample time to discover whether his interests lie chiefly in the field of pure chemistry or in the field of chemical engineering before he is compelled to decide upon his further course of study.

## ENTRANCE REQUIREMENTS IN FRENCH AND GERMAN

Two units of German and two units of French are required for entrance to the Courses in Chemistry. Students will not be allowed to register for the junior year until the entrance requirement in languages has been completed. A deficiency in these languages at entrance may necessitate more than the normal period of residence or an exceptionally heavy schedule.

## CURRICULUM NO. 1

## FIRST YEAR

	<i>Course</i>	<i>First Term</i>	<i>Second Term</i>
Introductory Inorganic Chemistry.....	Chemistry 103	3	2
Inorganic Chemistry Laboratory.....	Chemistry 105	3	—
Introductory Qualitative Analysis.....	Chemistry 203	—	5
Analytic Geometry and Calculus.....	Mathematics 5a, 5b	5	5
Introductory Experimental Physics....	Physics 3, 4	3	3
English.....	English 1	3	3
		17	18

## SECOND YEAR

Introductory Organic Chemistry.....	Chemistry 305	3	3
Organic Chemistry Laboratory.....	Chemistry 310	3	3
Introductory Quantitative Analysis....	Chemistry 220	3	—
Quantitative Analysis Laboratory.....	Chemistry 221	3	—
Introductory Chemical Spectroscopy...	Chemistry 505	—	3
Gas and Fuel Analysis.....	Chemistry 250	—	4
General Physics.....	Physics 31, 32	2	2
Physical Measurements.....	Physics 34	2	2
Drawing.....	Engineering 125	3	—
		19	17

## THIRD YEAR

Introductory Physical Chemistry.....	Chemistry 405	3	3
Physical Chemistry Laboratory.....	Chemistry 410	3	3
Advanced Inorganic Chemistry.....	Chemistry 130	3	3
Introductory Chemical Microscopy....	Chemistry 530	3	—
Advanced Quantitative Analysis.....	Chemistry 230	—	4
Elementary Mineralogy.....	Geology 311	3	—
Introduction to Economics.....	Economics 3	—	3
Elective.....		3	2
		18	18

## FOURTH YEAR

Introductory Industrial Chemistry.....	Chemistry	705	3	3
Seminary.....	Chemistry	905	—	1
Chemical Engineering.....	Chemistry	710	—	4
Electrical Engineering.....	Engineering	417	4	—
Elective.....	(at least)		10	10
			17	18

## CURRICULUM NO. 2

(This curriculum is prerequisite to registration for the degree of Chemical Engineer.)

## FIRST YEAR

As in Curriculum No. 1

## SECOND YEAR

As in Curriculum No. 1

## THIRD YEAR

		<i>Course</i>	<i>First Term</i>	<i>Second Term</i>
Introductory Physical Chemistry.....	Chemistry	405	3	3
Physical Chemistry Laboratory.....	Chemistry	410	3	3
Advanced Quantitative Analysis.....	Chemistry	230	4	—
Mechanics.....	Mechanics	330	5	—
Mechanics.....	Mechanics	332m,h	—	5
Introductory Engineering Laboratory..	Engineering	103	1	—
Materials of Construction.....	Engineering	360	2	2
Introductory Chemical Microscopy...	Chemistry	530	—	3
Elementary Mineralogy.....	Geology	311	—	3
			18	19

## FOURTH YEAR

Introductory Industrial Chemistry.....	Chemistry	705	3	3
Industrial Organization.....	Engineering	380	—	2
Heat Power Engineering.....	Engineering	343	3	3
Mechanical Laboratory.....	Engineering	368	3	—
Mechanical Laboratory.....	Engineering	369	—	3
Advanced Inorganic Chemistry.....	Chemistry	130	3	3
Introduction to Economics.....	Economics	3	3	—
Elective.....	(at least)		3	3
			18	17

The elective courses required in the curriculum may be chosen by the student, in each case with the approval of his adviser, from the advanced courses in Chemistry, or from courses in other departments of the College of Arts and Sciences, or in other colleges of the University.

Students in the Courses in Chemistry may not register for more than 20 hours a term without first securing the consent of the Department.

A student who does not pass at least twelve hours in any term, with a grade of C or better in at least six of the twelve hours, may be dropped from the University or placed upon probation. The same penalty may be imposed upon students in the Summer Session, who do not pass four hours, with a grade of C or better in at least two hours.

If, in the opinion of the Staff of the Department of Chemistry, a student's general record is unsatisfactory the Staff may recommend that he be refused permission to continue as a candidate for the degree of Bachelor of Chemistry, even though he has passed twelve hours or more in the preceding term. In general, a scholastic record which does not show the completion of at least twelve hours a

term of the prescribed studies and a grade of C or better in at least half of the hours in Chemistry, will not be considered satisfactory.

Students in the courses in Chemistry who receive a grade of "E" may remove it by examination or other requirement set by the Department.

### THE DEGREE OF CHEMICAL ENGINEER

A holder of the degree of Bachelor of Chemistry who has completed Curriculum No. 2, as given above, may obtain the degree of Chemical Engineer by completing a fifth year of study offered jointly by the College of Engineering and the Department of Chemistry of the College of Arts and Sciences. The curriculum for this fifth year leading to the degree of Chemical Engineer is as follows:

	<i>Course</i>	<i>First Term</i>	<i>Second Term</i>
Electrical Engineering Lectures.....Engineering	415	3	—
Electrical Engineering Lectures.....Engineering	416	—	3
Electrical Engineering Laboratory.....Engineering	435	2	—
Electrical Engineering Laboratory.....Engineering	436	—	2
Mechanical Engineering Laboratory...Engineering	372	2	—
Chemical Engineering Laboratory....Chemistry	710	—	4
Machine Design.....Engineering		3	—
Chemical Plant Design.....Chemistry	730	3	3
Electives.....		5	5
		<hr/> 18	<hr/> 17

The course of study leading to the degree of Chemical Engineer is intended primarily to prepare the graduate for technical work involving the development and supervision of the operation of industrial chemical processes and plants. It comprises instruction not only in the theoretical principles of chemistry and engineering, but also in the methods of applying these principles to the solution of the problems that arise in the industries.

## COURSES OF INSTRUCTION

*The courses that are marked with the asterisk (\*) may not be counted for an upper-class group.*

### ASTRONOMY

*For a major in Astronomy, the following courses must be completed: (1) in Astronomy, courses 181, 184, 185, 186, and practical work as arranged with the Department; (2) in related subjects, at least twenty-four hours selected from Physics 34a, 34b, 60, 105, 111, 211, 130, 230, 300, 571, 573, 581, 591, and 592; Chemistry 101 and 105; Mathematics 41, 42, 61, 62, 63, and 85; Geology 100.*

\*180. **Introduction to Astronomy.** Either term. Credit three hours. Lectures, Professor BOOTHROYD. *Lincoln* 31. Recitation and laboratory work, Professor BOOTHROYD. *Observatory*. Primarily for students who do not offer Physics for entrance and who have not had trigonometry. Lectures: T Th 10. Laboratory: One two-hour afternoon laboratory period a week and five evening observation periods a term, to be arranged.

181. **The Solar System.** Second term. Credit three hours. Prerequisite, Astronomy 180 (or Physics 3 and 4). Lectures and recitations, M F 10. *Lincoln* 31. Laboratory: *Observatory*. Hours to be arranged. Professor BOOTHROYD.

182. **The Elements of Field Astronomy.** Either term. Credit two hours. Prerequisites, Astronomy 180 and Mathematics 3 (or Surveying 110). Required of students in Civil Engineering. For hours and rooms see Schedule of Courses, Sections and Rooms for School of Civil Engineering. Professor BOOTHROYD and Mr. ROBERTS.

\*183. **History of Astronomy.** First term. Credit three hours. Prerequisite, Astronomy 180. M W F 10. Professor BOOTHROYD.

184. **The Sun, Stars, and Nebulae.** First term. Credit three hours. Prerequisites, Astronomy 181, Mathematics 4a and 4b, and Physics 61 and 62. Lectures and recitations: M W F 9. *Lincoln* 31. Professor BOOTHROYD.

185. **Special Topics in Astrophysics.** Throughout the year. Credit three hours. Prerequisites, Astronomy 184 and Physics 130. Professor BOOTHROYD.

186. **Geodetic Astronomy.** Throughout the year. Credit three hours. Prerequisites, Astronomy 182, Advanced Surveying 212 and Mathematics 4a and 4b or equivalents. Professor BOOTHROYD.

### BIBLIOLOGY

**Bibliology I.** First term. Credit two hours. The Book; its origin and evolution. Not a literary course, but a study of the book as a means of the conservation of thought, a manifestation of civilization and culture, its relation to the arts and crafts. Open to upperclassmen, but registration with the instructor is required. Professor KINKELDEY. T Th 12. *University Library*.

**Bibliology II.** (Bibliography). Second term. Credit two hours. The book as a source of information. The reference book; the handbook; book lists, general and special; catalogues and trade lists and their use. Open to upperclassmen but registration with the instructor is required. Professor KINKELDEY. T Th 12. *University Library*.

### BIOLOGY

*For a major in Anatomy, the following courses must be completed: (1) in Anatomy, Animal Biology 221, 222, 225; (2) in related subjects, at least twenty-eight hours selected from the following: Animal Biology 1, 11, 101, 102, 104, 300, 301, 303; Chemistry 101, 105; Physics 3, 4.*

For a major in *Biochemistry*, the following courses must be completed: (1) in *Biochemistry*, *Animal Biology* 314, 314a, 320, 317, 317a; (2) in related subjects, *Animal Biology* 300 or 303, *Chemistry* 101, 105, 210, 225, 375 and nine hours of electives.

For a major in *Entomology*, the following courses must be completed: (1) in *Animal Biology*, course 3 (first term), 4, 5, 6a, 6 (one term), and eight additional hours selected from the following with at least one course in each group—(a) 6 (three hours), 6b; (b) 12 (two hours); (c) 3 (second term), 20, 21; (d) 30, 31; (2) in related subjects, *Botany* 1, *Animal Biology* 1 and 14, and fourteen additional hours selected from the following and including at least two hours in each of three groups: (a) *Animal Biology* 8, 9, *Geology* 400; (b) *Botany* 117, *Bacteriology* 1; (c) *Animal Biology* 7, 11, 16, 17, 101, *Botany* 124; (d) *Animal Biology* 300, 301, 303, 314, *Botany* 31; (e) *Chemistry* 305, 310 or 375.

Students majoring in *Entomology* should have a reading knowledge of German and French.

For a major in *Histology*, the following courses must be completed: (1) in *Histology*, *Animal Biology* 101, 102, 104; (2) in related subjects, at least twenty-three hours, chosen from the following: *Animal Biology* 1, 11, 10, 14, 115, 221, 225, 300, 301, 303; *Chemistry* 101, 105, 375.

For a major in *Physiology*, the following courses must be completed: (1) in *Physiology*, *Animal Biology* 300, 301, 303, 309, (2) in related subjects, *Animal Biology* 1, 11; *Chemistry* 101, 105, 210, 375; *Physics* 3, 4, 55.

The major adviser should be consulted about additional elections in science.

For a major in *Zoology* there must be completed: (1) twenty-seven hours including *Animal Biology* 1 and fifteen hours of unstarred courses, and (2) fifteen hours in related fields selected from *Bacteriology*, *Botany*, *Chemistry*, *Geology*, *Philosophy*, *Psychology* and *Social Science*.

Choice of all courses should be made at a conference with the adviser.

For other majors in *Animal Biology*, consult the advisers.

## GENERAL BIOLOGY

**\*A. General Biology.** Throughout the year. Credit three hours a term. Professor CLAASSEN, Mr. WOODRUFF, and assistants. Lectures, M W 9 or 11, *Plant Sciences* 233. Laboratory, one period of two and one-half hours a week. *Roberts* 302.

Not open to students who have had both *Zoology* I and *Botany* I. If *Biology* is taken after either *Zoology* I or *Botany* I, credit two hours a term. Students must report to the biology laboratory, *Roberts Hall*, 302, at the time of registration, for assignment to laboratory section.

An elementary course designed for those who do not wish to specialize further in the biological sciences. The main ideas of biology shown through selected practical studies of the phenomena on which biological principles are based. Laboratory fee, \$3.50 a term.

## ANIMAL BIOLOGY

Enumeration of courses according to subject:

**General Zoology:** 1, 1a, 7, 8, 9, 11, 16, 17, 20, 21, 30, 65, 75, 99.

**Entomology:** 3, 4, 5, 6, 6a, 6b, 12, 31, 40, 70.

**Histology and Embryology:** 101, 102, 104.

**Cytology:** 10.

**Genetics:** 14.

**Human Anatomy and Neurology:** 221, 222, 225, 226, 250.

**Physiology:** 300, 301, 303, 305, 307, 308, 309, 310.

**Biochemistry:** 314, 314a, 320.

**Taxonomy:** Insects, 6, 6a, 6b; Vertebrates, 22, 23, 24, 25, 26, 67.

**Conservation:** 100.

**\*1: Introductory Zoology.** Throughout the year. Credit three hours a term. Professor REED, Dr. MEKEEL, Miss McMULLEN, Miss PHELPS. Lecture: Section I, T Th 9; Section II, T Th 11. Laboratory: M T W Th F 1:40-4; S 8-10:20. Lectures, *Goldwin Smith B.* Laboratory, *McGraw* 2.

A comprehensive introduction to the subject of Animal Biology. Fee \$3 a term.

**\*1a. General Zoology.** First term. Credit four hours. Assistant Professor YOUNG. Lecture, W 9; recitation, F 9, *McGraw* 5. Laboratory, T Th 8:00-10:20, *McGraw* 2. Primarily for veterinary students.

A foundation course planned to introduce a special group of students to the field of zoology. Laboratory fee, \$4.00. Permission must be secured for registration.

**3. General Entomology.** First term. Credit three hours. Prerequisite, Biology A, or Animal Biology 1, or Botany 1. Professor HERRICK, Mr. HORSFALL, Mr. BUTT, and Mr. PALM. Lecture, W F 9; Laboratory, T W Th or F 1:40-4; or S 8-10:30. *Roberts* 392.

The characteristics of orders, sub-orders, and the more important families; the habits of representative species; the structure of insects; practice in their classification.

The lectures only (two hours) may be taken by those who have had Animal Biology 4 and 5. Laboratory fee, \$2.50.

Second term. Credit three hours. The life histories, habits, and control of injurious insects. Staff and lectures as for the first term. Laboratory, W Th or F 1:40-4. Laboratory fee, \$2.

**4. Elementary Morphology of Insects.** Either term. Credit three hours. Professor JOHANNSEN and Mr. SHAW. By appointment. *Roberts* 391.

This course deals with the external and internal anatomy of several common species of insects. Required of all students who plan to take advanced work in entomology. Laboratory fee, \$2.

**5. Wing Venation and Evolution.** Either term. Credit one hour. Professor BRADLEY and Mr. PATE. Lecture, T 12, *Roberts* 392, and two additional hours during T afternoon or T Th mornings, by appointment, *Roberts* 301.

A laboratory study of evolutionary series as illustrated by progressive modification of the wings of insects. Required of all students who plan to take advanced work in entomology.

**6. Taxonomy of Insects.** Throughout the year. Credit three hours a term. Prerequisite, courses 4, 5, and 6a. Lecture, W 11, *Roberts* 392. Laboratory: M W 1:40-4; *Roberts* 301. Professor BRADLEY, Dr. FORBES, and Mr. PATE.

A survey of the classification of insects. The complete course occupies three consecutive terms, but the work of each may be taken independently. The orders treated will be: Fall of 1933, Coleoptera, Lepidoptera; Spring of 1934, Orthoptera, Diptera and minor orders. Laboratory fee, \$4.50.

Students desiring individually to make a more detailed survey of any particular group of insects may register under course 99.

**6a, 6b. Elementary Taxonomy of Insects.** Second term completed first term of following year. Credit one hour (a), two hours (b). Prerequisite for (a), courses 4 and 5; there are no prerequisites for (b). Professor BRADLEY and Mr. PATE. Laboratory and field work, second term: Th F 1:40-4:00; first term: by appointment.

(a) Elementary practice in the determination of the families and orders of insects. (b) After the Spring Recess: Methods of collecting insects and preserving them for study, and other matters of technique. Problems will be assigned to be completed during the summer and fall and reported on in the fall term. Either part of this course may be taken separately. No credit will be given for (b) until completed. Laboratory fee \$2.25 for each part.

**7. Biology of the Human Species.** First term. Credit one hour. Prerequisite, Biology A or the equivalent. Professor NEEDHAM. T Th 11. *Goldwin Smith* A.

The origin and development of man; the evolution of responsive life; the main phenomena of human inheritance; the effect upon population of the alteration of environment by the processes of civilization; the evolution of the social organism, and of social control.

8. **Elementary Taxonomy and Natural History of Vertebrates.** Throughout the year. Credit, three hours a term. Not normally open to freshmen. Professor WRIGHT and Dr. HAMILTON. Lecture, M 8; Laboratory, M W 1:40-4 or T Th 1:40-4. *McGraw* 7.

Lectures on fishes, amphibians, reptiles, birds and mammals, dealing with the principles of classification and nomenclature, characteristics, relationships, and bionomics of these groups. The laboratory gives practice in the identification of North American species. Field studies of the local fauna are undertaken during the fall and spring. Several all day field trips are taken during the year. Laboratory fee, \$4 a term.

Students completing this course may arrange under Animal Biology 99 to pursue advanced work in the taxonomy of Vertebrates.

9. **General Ornithology.** Second term. Credit three hours. Professor ALLEN and Mr. KELLOGG. Lecture, W 11. *McGraw* 5. Laboratory and field work, M W 1:40-4 or T Th 1:40-4. *McGraw, South Museum*.

Introduction to the study of birds, particularly the local species. Laboratory work with bird skins is based on the field work. Laboratory fee, \$3.

Students completing this course may arrange, under course 99, to pursue advanced work during their junior and senior years.

10. **Cytology.** See Botany 124.

11. **Comparative Anatomy of Vertebrates.** Throughout the year. Credit three hours a term. Prerequisite, Animal Biology 1. Dr. SENNING, Mr. HUNTER, and Mr. TASKER. Lecture, Section I, M 8, Section II, M 10. *McGraw* 5. Laboratory, W F 8-10:30; M F 1:40-4; T Th 8-10:30; T Th 1:40-4; W 1:40-4; S 8-10:30. *McGraw* 6.

A thorough dissection and study of representative vertebrate types. The lectures are arranged to correlate and supplement the studies made in the laboratory.

12. **Insect Morphology.** Throughout the year. Credit two hours a term. Prerequisites, Animal Biology 4, and 3 or 6a. Professor JOHANNSEN. T Th 10. *Roberts* 392. This course deals with the anatomy, histology, physiology, and embryology of insects. Lectures, assigned readings, and reports.

Laboratory work in the technique of histological methods as applied to insect tissues may accompany or follow this course. Either term. Credit two hours. Two periods by appointment. *Roberts* 391. Laboratory fee, \$3.

14. **Genetics.** First term. Credit four hours. Prerequisite, Botany 1 and Plant Physiology, or Animal Biology 1 and either Animal or Human Physiology. Assistant Professor FRASER and Dr. DORSEY. Lectures, M W F 8. *Plant Science* 143; Laboratory, M W or F 1:40-4. *Plant Science* 146. One conference period to be arranged.

Courses in cytology and in taxonomic botany and zoology will be found helpful in connection with this course. Students must obtain assignment to sections at the time of registration. Laboratory fee, \$3; deposit \$2.

16. **Invertebrate Zoology.** Throughout the year. Credit three hours a term. Prerequisite, Animal Biology 1 or its equivalent. Assistant Professor YOUNG. Lecture, F 11, *McGraw* 5. Laboratory, M and F 1:40-4, *McGraw* 2.

A comprehensive consideration of the morphology, classification, development, and phylogeny of the invertebrates. Laboratory fee, \$2.50.

17. **Mammalian Anatomy.** First term. Credit three hours. Dr. SENNING. Laboratory to be arranged.

This course is designed to provide a foundation in mammalian morphology.

Not open to pre-medical students. No credit given to those who have had course 11.

20. **Animal Ecology.** First term. Credit three hours. Prerequisite, Zoology 1 or Biology A, and Entomology 3. Professor NEEDHAM and Mr. SARGENT. Th 9, Th 1:40-4, and one period by appointment.

The lives of animals in relation to their environment; the relation between their structures and instincts and the situations in which they live. Laboratory fee, \$2.50. Courses 20 and 21 are given in alternate years.

[21. **General Limnology.** First term. Credit three hours. Prerequisite or parallel courses, Biology A, or Animal Biology 1 and 3, or the equivalent. Professor NEEDHAM and Mr. SARGENT. Lecture, T h 9; Laboratory, Th 1:40-4 and one period by appointment. *Roberts* 392. Not given in 1933-34.]

The life of inland waters; aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. Laboratory fee, \$2.50.

[22. **Ichthyology, Advanced Systematic and Field Zoology.** Throughout the year. Credit three hours a term. Lectures, T Th 8. *McGraw* 7. Laboratory, F 1:40-4 or S 8-10:30. Professor WRIGHT and Dr. HAMILTON. Not given in 1933-34.]

[23. **Herpetology (Amphibia).** First term. Credit three hours. Professor WRIGHT and Dr. HAMILTON. Lectures, T Th 8. *McGraw* 7. Laboratory, F 1:40-4 or S 8-10:30.]

[24. **Herpetology (Reptilia).** Second term. Credit three hours. See Announcement for course 23. Professor WRIGHT and Dr. HAMILTON. Not given in 1933-34.]

25. **Mammalogy.** Credit three hours a term. See Announcement for course 23. Professor WRIGHT and Dr. HAMILTON.

An amplification of the prerequisite course 8. In the lectures, special emphasis is laid on the principal phases of animal life; the taxonomy, origin, and evolution of fossil and living groups; geographical distribution; and the literature and institutions of zoology. Laboratory periods are devoted to the identification of exotic and indigenous forms.

26. **Advanced Ornithology.** First term. Credit three hours. Prerequisite, Animal Biology 8 or 9. Professor ALLEN and Mr. KELLOGG. Lecture, W 11, *McGraw, South Museum*. Laboratory and field work, T Th 1:40:4.

The structure and classification of birds; geographical distribution; the literature and institutions of ornithology; identification of representative birds of the world. The first part of the term will be devoted to field work on the fall migration, and the identification of birds in winter plumage. Laboratory fee, \$3.

30. **Parasites and Parasitism.** First term. Credit two or three hours. Prerequisite, Biology A or Zoology 1. Lecture, T 9. *Bailey Hall*. Practical exercises, M or T 1:40-4, or T 10-12:30. Professor MATHESON and Mr. BRODY.

A consideration of the origin and biological significance of parasitism, and of the structure, life, and economic relations of representative parasites. A limited number of well-prepared students will be permitted to take the extra hour's credit. The work will occupy one afternoon a week and will be devoted to the technique of the diagnosis of parasitic infections, preparation of material from post-mortem examinations, and advanced work in Parasitology. Laboratory fee, \$2 or \$4.

31. **Medical Entomology.** Second term. Credit two or three hours. Prerequisite, Zoology 1 or Biology A. Lecture, T 9. *Bailey Hall*. Practical exercises, M or T 1:40-4, or T 10-12:30. Professor MATHESON and Mr. BRODY.

This course deals with insects and other arthropods that are causative agents of disease in man and animals, or are the vectors, or intermediate hosts, of disease-producing organisms. A limited number of well prepared students will be permitted to take the extra hour's credit. The work will occupy one afternoon a week and will consist of detailed studies of selected groups of insects in their relation to disease causation or as vectors of pathogenic organisms of animals. Laboratory fee, \$2 or \$4.

40. **Bees.** Second term. Credit three hours. Prerequisite, Animal Biology 3 or equivalent. Professor PHILLIPS. Lectures, T Th 9; laboratory, 1:40-4. *Dairy* 157.

Fundamentals of beekeeping; the life history, instincts, and general behavior of bees; their products; the sources of honey; the rôle of bees in cross-pollination; the equipment of the apiary; wintering problems; the diseases of bees; and the rearing of queens. Laboratory fee, \$2.50.



65. **The Technics of Biological Literature.** First term. Credit three hours. Professor BRADLEY. See Announcement of Graduate School.

67. **Seminary in Systematic Vertebrate Zoology.** First and second terms. Credit one hour a term. Life zone plans of North America, 1817-1920. Distribution and origin of life in North America. Zoogeography of the Old World. Animal coloration. Other topics to be announced. Hours to be arranged. Professor A. H. WRIGHT.

70. **Entomological Reading in Foreign Languages.** Throughout the year. Professor JOHANNSEN. See Announcement of the Graduate School.

75. **Laboratory Methods.** Second term. Credit two hours. Prerequisite, major work in Biology. Admission only by consent of instructor. Professor CLAASSEN in charge. F 10-12:30 and 1:40-4. Laboratory fee, \$4.

For seniors whose upperclass group is in the field of Biology, and for graduates who expect to teach or to follow some phase of zoology as a profession. This course includes such subjects as laboratory equipment; collecting, preservation, and storage of materials; rearing of cultures; modelling in wax; injection of blood vessels and embalming; chart making, and photography of animals including the preparation of lantern slides.

99. **Zoological Problems.** An introduction to research. Throughout the year. Credit hours variable. Admission to the course is by consent of the instructor.

For qualified juniors and seniors. Opportunity is afforded for the pursuit of special problems designed to offer practice in the method of research.

\*100. **Conservation of Wild Life.** First term. Credit two hours. Professors NEEDHAM, HOSMER, WIEGAND, WARREN, HERRICK, ADAMS, EMBODY, PALMER, WRIGHT, CLAASSEN, ALLEN, and Assistant Professor YOUNG. T Th 11. *McGraw* 5.

101. **The Tissues: Histology and Histogenesis.** First term. Credit four hours. Prerequisite, Animal Biology 1 or Biology A. Professor KINGSBURY, Instructor SNOOK, and assistants. Lectures, T Th 11. *Stimson* 8; Laboratory, Section I, T Th 8-11; Section II, T Th 1:40-4. *Stimson* 39.

For students of biology or those preparing for medicine. The cell and cellular origin of the body, and the structure and development of its component tissues. Each student will prepare or receive a series of typical microscopic preparations.

102. **The Organs: Histology and Development.** Second term. Credit four hours. Prerequisite, Animal Biology 101 or its equivalent. Professor KINGSBURY and assistants. Lectures, W F 10, *Stimson* 8; laboratory, W F 1:40-4, *Stimson* 39.

A continuation of course 101. Courses 101 and 102 together give the fundamental facts of the microscopic structure and development of the body.

104. **Vertebrate Embryology.** Second term. Credit five hours. Prerequisite, Animal biology 101 or its equivalent. Professor KINGSBURY, Instructor SNOOK and assistants. Lectures, T Th 11 and lecture or conference, S 11, *Stimson* 8; laboratory, Section I, T Th 8-11; Section II, T Th 1:40-4, *Stimson* 39.

For students of biology or those who are preparing for the study of medicine. The course is designed to give the basis for understanding the development of the human body.

221. **Structure of the Human Body.** Second term. Credit three hours. Prerequisite, Animal Biology 1 or 303 or other equivalent biological courses. Professor KERR. Lectures, M W F 8; one demonstration at an hour to be arranged. *Anatomy Amphitheater. Stimson.*

For students in the biological sciences and for others wishing to obtain a knowledge of the structure of their own bodies. Normal structures of the body, together with its variations and evolution based on developments in the individual and the race. Illustrated by specimens, lantern slides, and diagrams.

222. **Anatomical Methods and Kinesiology.** First term. Credit three hours. Prerequisite, Animal Biology 1. Previous work in Comparative Anatomy also is

recommended. Assistant Professor PAPEZ and instructors. The laboratory is open any morning except Saturday. Lecture, Th 12. *Stimson* 49; laboratory, *Stimson* 52.

One lecture and nine hours of laboratory a week are required.

225. **Comparative Neurology.** Second term. Credit three hours. Prerequisite, Animal Biology I and II. Assistant Professor PAPEZ. T Th 8-11. *Stimson* 52.

A comparative study of the vertebrate nervous system based on dissections of brains of shark and dog, and sections of cat brain stem; of the chief nerve mechanisms that determine the form and structure of the nervous systems, their evolutionary and functional significance. One recitation and two laboratory periods.

226. **Cerebral Mechanisms.** Second term. T Th 8-11. Credit three hours. Prerequisite, course 225. Assistant Professor PAPEZ.

A course of study of the cerebral cortex of lower mammals and the primates with special reference to the subcortical connections and functional significance of the various cortical areas of the human brain. Conference hour will be arranged later. Recommended for students in psychology and animal behavior, by consent of the instructor.

229. **Kinesiology.** First term. Credit three hours. Assistant Professor PAPEZ and instructors. One lecture and six hours of laboratory a week. Anatomy laboratory. *Stimson*. Laboratory any morning except S. Lecture hour to be arranged. (See Physical Education Course 20).

250. **Advanced and Research Work in Human Anatomy and Neurology.** Throughout the year. Credit two or more hours a term. Professor KERR and Assistant Professor PAPEZ. Hours to be arranged. *Stimson* 52.

The laboratories are open to those who have taken the necessary preliminary courses and are otherwise prepared. Primarily for graduates, and for undergraduates properly qualified.

300. **General Physiology.** First term. Credit three hours. Professor LIDDELL. Lectures, T Th 9. Laboratory, Th 1:40-4. Prerequisite, Animal Biology I or A, or an equivalent satisfactory to the Department. *Stimson* 28.

The purpose of this course and of Animal Biology 301 is to familiarize the student with the methods and point of view of physiology in the study of animal biology. An analysis of the fundamental functions of the animal organism.

[301. **General Physiology.** Second term. Credit three hours. Professor LIDDELL. Lectures, T Th 9. Laboratory, Th 1:40-4. Prerequisite, Animal Biology I or A, or an equivalent satisfactory to the Department. *Stimson* 28. Not given in 1933-34.]

The integration of vital functions in the animal organism. It is desirable but not necessary that this course be preceded or followed by Animal Biology 300.

\*303. **Human Physiology.** Repeated in second term. Credit three hours. M W F 10. Assistant Professor DYE and instructor.

An introductory course for students of the biological sciences, for those who expect to teach physiology in the secondary schools, and for those who desire a general knowledge of the physiological processes as applied to the human body. This course is designed primarily for students who are already familiar with the first principles of biology and chemistry and who are in a position to understand the general physiological processes presented.

305. **Physiology and Biophysics of Radiation.** Second term. Credit two hours. Open to graduate students and qualified seniors. Dr. MAUGHAN. M W 2-4. Discussions and demonstrations. *Stimson*.

[306. **Exercise and Its Physiology.** First term. Credit three hours. Assistant Professor DYE. Lectures, W F 8. Laboratory, W 1:40-4. *Stimson Hall* 31. Prerequisite, Human Physiology 303 or its equivalent. See Physical Education 27. Open to juniors and seniors. Not given in 1933-34.]

An explanation of the physiologic, dynamic, and mechanical factors involved in bodily movement and in the performance of work; the physiologic mechanisms of adaptation in exercise, the bodily reserves, and their limitations. The human

body is considered as a super-machine with variable capacities and limitations depending upon its physical inheritance, development, and training.

**307. Comparative Physiology of Behavior.** First term. Credit three hours. Professor LIDDELL. M W F 9. Two lectures and one laboratory demonstration hour. Prerequisite, Animal Biology 1 or A, or an equivalent satisfactory to the Department. *Stimson* 28.

By means of laboratory demonstrations and moving pictures the student may observe the behavior of representative animal types from protozoan to vertebrate. The analysis of receptor, effector, and correlation mechanisms will be followed by a critical review of theories of behavior from the physiological point of view.

**308. Advanced Work and Research in Physiology.** Throughout the year. Credit two or more hours. Prerequisite, previous courses in Physiology. Assistant Professor DYE. *Stimson* 31.

**[309. Physiology of Respiration, Vital Dynamics, and the Circulation.** First term. Credit three hours. Lecture, day and hour to be arranged; laboratory, M W afternoons. Assistant Professor DYE. Open to upperclassmen who have completed course 302 and 303, or their equivalent, and who are otherwise qualified. *Stimson* 13. Not given in 1933-34.]

A study of the physical and chemical processes of the cell, and of the body as an aggregate of cells; respiration; circulation; and muscular activity.

**310. Seminary in Physiology.** Second term. Credit one hour. For graduate students and others properly qualified. Hour to be arranged. Members of the staff. *Stimson* 4. Reports on recent advances in physiology.

**314. Elementary Biochemistry.** First term. Credit three hours. Prerequisite, Chemistry 375 or the equivalent. Professor SUMNER, Dr. HAND, and Mr. HOWELL. Lectures, M W 12; conferences, F 12. *Stimson* 4.

The substances met with in living things, and the chief facts of digestion, metabolism, and nutrition. (Courses 314 and 314a will not be accepted for the requirements of biochemistry in the Medical College. Chemistry students are advised to take Biochemistry for Medical Students. See the Announcement of the Medical College.)

**314a. Laboratory Work in Biochemistry.** First term. Credit two hours. Prerequisite or parallel course, Animal Biology 314. Professor Sumner, Dr. HAND, and Mr. HOWELL. M W 1:40-4. *Stimson* 34.

**320. Advanced and Research Work in Biochemistry.** Throughout the year. Credit two or more hours. Prerequisite, Animal Biology 314 and 314a. Professor SUMNER. Hours to be arranged. *Stimson* 34. For other courses in Biochemistry see the Announcement of the Medical College.

## BOTANY

*For a major in Botany the following courses must be completed: (1) in Botany, courses 1, 31, and 117: 123 or 124 or 126: one additional course of three or more hours credit; (2) in related subjects, eighteen hours to be selected from: Chemistry 101, 105, 205, 206, 375; Animal Biology 1, 3, 8, 11, 14, 300, 301; a general course in Bacteriology; Plant Pathology 1, 121, 122; Geology A, 200, 400, 403.*

*Students wishing instruction in special groups of plants or in special subjects should consult the department.*

**\*1. General Botany.** Throughout the year. Credit three hours a term; both terms of the course must be completed to obtain credit, unless the student is excused by the department. If taken after General Biology A, credit two hours a term. Professor PETRY, Mr. LAUBENGAYER, Mr. SCHAPPELLE, Mr. SNELL, Miss ALMSTEDT, Mr. PALMQUIST, Mr. REECE, and others. Lectures, T Th 9 or 11. *Plant Science* 233. Laboratory, one period of two and one-half hours. *Plant Science* 240, 242, 262.

A survey of the fundamental facts and principles of plant life. The work of the first term deals with the structures and functions of the higher plants, with special emphasis on their nutrition. The work of the second term traces the evolution of

the plant kingdom, as illustrated by representatives of the principal groups, and concludes with a brief introduction to the principles of classification of the flowering plants. Laboratory fee, \$3.50 a term.

**13. Trees and Shrubs.** First term. Credit three hours. Prerequisite, course 1 or its equivalent. Professor WIEGAND and Mr. LINDSAY. Lecture, T 8. *Plant Science* 143. Laboratory or field work, M W or T Th 1:40-4. One all-day field trip is required. *Plant Science* 211.

The identification of trees and shrubs, in summer and in winter conditions. The laboratory work covering identification will be done largely in the field. The work of the latter part of the term will be the study of the taxonomy of woody plants. For all students wishing a detailed knowledge of trees and shrubs. Laboratory fee, \$3; deposit, \$5.

**31. Plant Physiology.** First or second term. Credit four hours. Prerequisite, course 1 and Chemistry 101 and 105. Professor KNUDSON, or Professor O. F. CURTIS, and Assistant Professor HOPKINS, Mr. CLARK, and Mr. FLEISCHER. Lectures, T Th 10. *Plant Science* 143. Laboratory, T Th 1:40-4; or W F 1:40-4. *Plant Science* 227.

This course is designed to acquaint the student with the general principles of plant physiology. Topics such as water relations, photosynthesis, translocation, digestion, respiration, mineral nutrition, growth, and reproduction are studied in detail; in both laboratory and recitations emphasis is placed on discussion of the principles taught and their applications. Laboratory fee, \$4; deposit, \$3.

**117. Taxonomy of the Higher Plants.** Second term. Credit four hours. Prerequisite, course 1 or its equivalent. Professor WIEGAND. Lecture, M 9. Laboratory, M W F 1:40-4. *Plant Science* 211.

A study of the kinds of seed plants and ferns, their classifications into genera, families, and orders, and field work on the local flora. Emphasis will be placed on wild plants, but the more common cultivated plants will receive some attention. The course is planned to follow course 1 and to furnish an introduction to the knowledge of the field botany and classification of the higher plants, in preparation for special work in various departments, and as an aid in teaching. Instruction will be given in the preparation of an herbarium and of keys. Laboratory fee, \$4; deposit, \$5.

Students completing this course may arrange, under courses 145 or 219, to pursue special advanced work in taxonomy.

**123. Plant Anatomy.** First term. Credit four hours. Prerequisite, course 1 or its equivalent, and permission to register. Lecture and conference, T 9. Laboratory, T 10-12:30; Th 9-11:30; S 9-11:30. *Plant Science* 228. Professor EAMES and Dr. JACKSON.

This course is designed to give a working acquaintance with the internal morphology of vascular plants, and emphasis is placed on practice in interpretation and determination of material. The course is planned primarily for students in applied fields of botany, such as pathology, pomology, or genetics. Students desiring a less detailed training in this subject should take course 126. Laboratory fee, \$5.

**124. Cytology.** Second term. Credit four hours. Prerequisite, course 1 or Zoology 1 and preferably course 126. Professor L. W. SHARP. Lectures, T Th 9. *Plant Science* 143. Laboratory, T Th or W F 10-12:30 or W 1:40-4, S 8-10:30. *Plant Science* 219.

Intended for those who have had some biological training. The principal topics considered are protoplasm, cells and their components, nuclear and cell division, meiosis and fertilization, and the relation of these to the problems of development, reproduction and heredity. Both plant and animal materials are used. Microtechnique is not included. Laboratory fee, \$5.

**125. Microtechnique.** First term. Credit three hours. Prerequisite, permission to register. Professors EAMES and SHARP. Hours to be arranged. *Plant Science* 219. Laboratory fee, \$10.

A course for advanced students who require training in the preparation of plant materials for histological and cytological study.

[126. **Morphology of Vascular Plants.** First term. Credit four hours. Professor EAMES and Dr. JACKSON. Prerequisite, course 1 or its equivalent. Lectures, T Th 9; Laboratory, T Th 10-12:30. *Plant Science* 228.

An advanced course in the comparative morphology, life histories and phylogeny of vascular plants. Laboratory fee, \$5. Not given in 1933-34.]

**Comparative Morphology of Fungi.** Given in the department of Plant Pathology.

[141. **History of Botany.** Second term, without credit. Hours to be arranged.

A course of lectures given by various members of the staff with the purpose of acquainting advanced students of botany with the historical development of their science. Not given in 1933-34.]

145. **Special Problems in General Botany, Taxonomy, Histology, Cytology, and Physiology.** Throughout the year. Credit not less than two hours a term. By appointment. Professors WIEGAND, KNUDSON, EAMES, L. W. SHARP, O. F. CURTIS, and PETRY, and Assistant Professors MUENSCHER and HOPKINS.

Students engaged in special problems or making special studies may register in this course. They must satisfy the instructor under whom the work is taken that their preparation warrants their choice of problem. The laboratory fee depends on the nature of the work and on the number of credit hours.

219. **Advanced Taxonomy of Vascular Plants.** Second term. Credit two hours. Prerequisite, course 117 or its equivalent. Professor WIEGAND. Hours to be arranged. *Plant Science* 211.

Special round-table discussion of topics of particular interest to the taxonomist. One hour is devoted to practical work on some group of plants.

231. **Plant Physiology.** Advanced lecture course. Throughout the year. Credit three hours a term. Prerequisite, training in botany and chemistry, to be determined in each case by the department. Limited to seniors and graduate students. Professors KNUDSON and O. F. CURTIS. Lectures, M W F 10. *Plant Science* 143.

232. **Plant Physiology.** Advanced laboratory course. Throughout the year. Credit three hours a term. Prerequisite or parallel, course 231. Professors KNUDSON, O. F. CURTIS, and Assistant Professor HOPKINS. Laboratory, M 1:40-4; S 8-1. *Plant Science* 241. Laboratory fee, each term, \$10; breakage deposit, \$5.

For other courses in Botany see the Announcement of the College of Agriculture.

## CHEMISTRY

All courses listed below are to be given in the Baker Laboratory of Chemistry.

For a major in Chemistry, the following courses must be completed: (1) in Chemistry, courses 101, 105; 205 and 206, or 210; 220 and 221, or 225; 305, 310 (first term); 405, 410 (one term); and six hours of electives; (2) in related subjects, Physics 3 and 4, German 1 or 1a unless two units have been offered for entrance; twelve additional hours to be selected from: Astronomy 180 and 181; Bacteriology 1, 43, 43a; Biochemistry 314; Biology A; Animal Biology 1; Botany 1; Geology A, 100, 311; Mathematics (the completion of courses to and including Analytic Geometry and Calculus is recommended); Physics (any course); other courses subject to approval of the Department of Chemistry.

### INORGANIC CHEMISTRY

\*101. **Introductory Inorganic Chemistry.** Lectures. Repeated in the second term. Credit three hours.

Two sections: M W F 11; T Th S 11. Main Lecture Room. Professor BROWNE and Assistant Professor LAUBENGAYER.

Entrance credit in chemistry does not carry with it University credit in Course 101 or 105. If a student entering the University from a preparatory school desires credit

for these Courses, he must pass an examination set by the Department of Chemistry. This examination is held in Ithaca on the same day in September as the entrance examination. University credit in Courses 101 and 105 that is obtained by passing this examination does not carry with it entrance credit in Chemistry.

Examinations for those who were unavoidably absent from the final examination in Courses 101 and 105 will be held at 2 p. m. on the day before instruction begins in the fall.

\*103. **Introductory Inorganic Chemistry.** Throughout the year. Credit three hours first term, two hours second term. Prerequisite, entrance credit in chemistry, or course 101. Required of, and limited to, candidates for the degree of Bachelor of Chemistry.

Lectures: Assistant Professor LAUBENGAYER. First term, T Th S 11; second term, T Th 11. *Baker 107.*

\*105. **Introductory Inorganic Chemistry.** Recitations and laboratory practice. Repeated in the second term. Credit three hours.

Recitations, one hour a week, to be arranged.

Laboratory sections: M F 1:40-4; T Th 1:40-4; W 1:40-4; S 8-10:30. Room 150. Professor BROWNE, Assistant Professor LAUBENGAYER, and assistants.

Chemistry 101 and 105 must be taken simultaneously unless permission is obtained by the student from the Dean of his college and from the Department of Chemistry to take either course alone.

130. **Advanced Inorganic Chemistry.** Throughout the year. Credit three hours a term. Prerequisite or parallel courses, Chemistry 405 and 410. Assistant Professor LAUBENGAYER. M W F 11. *Baker 107.*

Lectures. The chemical elements are discussed in the order in which they occur in the Periodic Table of Mendeléeff, with special attention to the group properties of the elements and to the relations of the groups to one another. The rare elements are treated in as great detail as are the more common elements.

135. **Advanced Inorganic Chemistry.** Either term. Credit one to six hours. Prerequisite, Chemistry 305 and 310. Professor BROWNE, Assistant Professor LAUBENGAYER, and assistants. Day and hour to be arranged. *Baker 178 and 122.*

Laboratory practice. The preparation, purification, properties, and reactions of inorganic compounds including those of the rarer elements.

Chemistry 135 is designed to accompany Chemistry 130, but either course may be taken separately.

140. **Selected Topics in Advanced Inorganic Chemistry.** Second term. Credit two hours. Prerequisite, Chemistry 405 and 410, or special permission. Professor BROWNE. W F 9. *Baker 107.*

[150. **The Chemistry of Glass.** Second term. Credit one hour. Assistant Professor LAUBENGAYER. M 9. *Baker 107.* Open to students who have had or are taking course 405; and to others by special permission.

A discussion of the development and manufacture of glass and related ceramic ware, such as pottery and porcelain, with special emphasis on the relations between constitution and physical and chemical properties. Inspection trips to nearby ceramic plants will be arranged. Not given in 1933-34.]

195. **Research for Seniors.** Throughout the year. Credit two or more hours a term. Professor BROWNE and Assistant Professor LAUBENGAYER.

#### ANALYTICAL CHEMISTRY

203. **Introductory Qualitative Analysis.** Second term. Credit five hours. Prerequisite, one term of Chemistry 103, or special permission. Must be taken with the second term of Chemistry 103. Required of, and limited to, candidates for the degree of Bachelor of Chemistry. Assistant Professor NICHOLS, Mr. AVENS, and assistants.

Lecture or recitation: M 9. Mr. AVENS. *Baker 177.* One other recitation, to be arranged.

Laboratory: M W F 1:40-4. *Baker 50.*

**\*205. Introductory Qualitative Analysis.** First term only. Credit three hours. Prerequisite, Chemistry 101 and 105. Must be taken with Course 206. Assistant Professor NICHOLS, Mr. AVENS, and assistants. Lectures: M W 9. *Baker 177.*

Recitations: one hour a week, to be arranged.

A study of the application of the theories of general chemistry, to the systematic separation and detection of the common elements and acid radicals.

**\*206. Introductory Qualitative Analysis.** First term only. Credit three hours. Prerequisite, Chemistry 101 and 105. Must be taken with Course 205. Mr. AVENS and assistants.

Laboratory section: M W F 1:40-4. *Baker 50.*

Laboratory practice. A study of the properties and reactions of the common elements and acid radicals; the qualitative analysis of a number of solutions and solid compounds.

**\*210. Introductory Qualitative Analysis.** Shorter course. Repeated in the second term. Credit three hours. Prerequisite, Chemistry 101 and 105. Mr. AVENS and assistants.

Lecture: Mr. AVENS, T 12. *Baker 207.*

Laboratory sections: T Th 8-10:30; T Th 1:45-4. *Baker 40.*

A study of the properties and reactions of the common elements and acid radicals, and their detection in various solutions.

**215. Advanced Qualitative Analysis.** First term. Credit three hours. Prerequisite, Chemistry 220, 221, 305, and 310. Assistant Professor NICHOLS, Mr. AVENS, and assistants. Day and hour to be arranged. *Baker 50.*

Laboratory practice. Essentially a continuation of Course 206. The methods for separating and detecting a number of metals and acids not studied in Course 206, including many of the rare elements. The qualitative analysis of a number of solutions, solid mixtures, natural and commercial products will be required. For graduates and advanced undergraduates.

**\*220. Introductory Quantitative Analysis.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 205 and 206. Must be taken with Course 221. Assistant Professor NICHOLS, Dr. MORSE, and assistants.

Lectures: Assistant Professor NICHOLS. T Th 9. *Baker 207.*

Recitations: one hour a week, to be arranged.

A study of the fundamental principles of gravimetric and volumetric analysis with practice in stoichiometry.

Students in science are advised, and candidates for the degree of Bachelor of Chemistry are required, to take this course together with Course 221 instead of Course 225.

**\*221. Introductory Quantitative Analysis.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 205 and 206. Must be taken with Course 220. Dr. MORSE and assistants.

Laboratory sections: T Th 10-12:30, Th 1:40-4 (first term only); F 1:40-4, S 8-1. *Baker 252.*

Laboratory practice in the preparation and standardization of various volumetric solutions and the analysis of a variety of substances by volumetric and gravimetric methods.

Students in science are advised, and candidates for the degree of Bachelor of Chemistry are required, to take this course together with Course 220 instead of Course 225.

**\*225. Introductory Quantitative Analysis.** Shorter course. Repeated in the second term. Credit three hours. Prerequisite or parallel course, Chemistry 210. Assistant Professor NICHOLS and assistants.

Lecture: Assistant Professor NICHOLS. Th 12. *Baker 207.*

Laboratory sections: T Th 8-10:30; M W 1:40-4; T Th 1:40-4. *Baker 252.*

A study of the fundamental principles of gravimetric and volumetric analysis, and the analysis of various substances by these methods.

230. **Advanced Quantitative Analysis.** Repeated in the second term. Credit four hours. Prerequisite, Chemistry 220 and 221. Assistant Professor NICHOLS, Dr. MORSE, and assistants. Recitation: one hour a week, to be arranged. Laboratory periods; first term, T Th 1:40-4; T Th 8-12:30; second term, T Th 1:40-4; T Th 8-12:30; S 8-1. *Baker 294.*

Students will be assigned to a combination of laboratory periods that will total seven and one-half hours a week.

The calibration of weights and volumetric apparatus; the analysis of ferrous and non-ferrous alloys, silicates and organic substances by various gravimetric, volumetric, and combustion methods.

235. **Advanced Quantitative Analysis.** Lectures. Second term. Credit two hours. Prerequisite, first term of Chemistry 405. Assistant Professor NICHOLS. M W 12. *Baker 207.*

A theoretical discussion of selected topics in quantitative analysis including sampling, indicators, potentiometric and conductometric titrations, together with the development and present status of various analytical methods.

240. **Electrochemical Analysis.** Repeated in the second term. Credit two hours. Prerequisite, Chemistry 230 and 405. Assistant Professor NICHOLS and Dr. MORSE. Day and hour to be arranged. *Baker 292.*

Laboratory practice in the electrochemical methods for the determination of silver, lead, copper, tin, nickel, cobalt, zinc, iron, etc.; the analysis of alloys and ores.

250. **Gas and Fuel Analysis.** Repeated in the second term. Credit four hours. Prerequisite, Chemistry 220 and 221. Dr. MORSE and assistants. Lectures: Dr. MORSE. W F 10. *Baker 207.*

Laboratory sections: first term, M T 1:40-4, W Th 1:40-4; T Th 10-12:30; S 8-1; second term, M T or Th 10-12:30, 1:40-4; S 8-1; W 1:40-4, F 10-12:30. *Baker 282.*

The complete analysis of coal gas, flue gas, and air, the determination of the heating power of gaseous, liquid, and solid fuels; the analysis of coal; standard methods of testing, various petroleum and coal-tar products; the analysis of various substances by methods involving the use of different types of gas evolution apparatus. Problems are assigned which afford practice in the calculation and interpretation of results.

270. **Special Methods of Quantitative Analysis.** Either term. Credit two or more hours. Prerequisite, Chemistry 230 and 235. Assistant Professor NICHOLS, Dr. MORSE, and assistants. Day and hour to be arranged. *Baker 277.*

Laboratory practice in the application of special methods such as indirect analysis, conductometric and potentiometric titrations, etc., to quantitative analysis and the analysis of special materials. The study of the important methods and special forms of apparatus used in scientific gas analysis.

Within certain limits the work may be selected to suit the requirements of the individual student.

275. **Quantitative Microanalysis.** Either term. Credit three or more hours. Prerequisite, Chemistry 230 and special permission. Assistant Professor NICHOLS. M W 9-5. *Baker 277.*

Laboratory practice in typical methods of both organic and inorganic quantitative microanalysis.

295. **Research for Seniors.** Throughout the year. Credit two or more hours a term. Assistant Professor NICHOLS, Dr. MORSE, and Mr. AVENS.

#### ORGANIC CHEMISTRY

305. **Introductory Organic Chemistry.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 210 and 225 (or 205, 206, 220, and 221). Open to those who are taking Course 220. Professor JOHNSON and Dr. TALLMAN. M W F 9. *Baker 207.*

Lectures and written reviews. The more important compounds of carbon, their occurrence, methods of preparation, relations and uses; illustrated by experiments and material from the museum.



**310. Introductory Organic Chemistry.** Throughout the year. Credit three hours a term. Prerequisite or parallel course, Chemistry 305. Professor JOHNSON, Dr. TALLMAN, Dr. CONNOR, and assistants. Laboratory sections, T Th 10-12:30, Th 1:40-4; F 1:40-4, S 8-1. *Baker 250.*

Laboratory practice and oral reviews. The student prepares a large number of typical compounds of carbon and familiarizes himself with their properties, reactions, and relations.

**315. Advanced Organic Chemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 305 and 310. Professor JOHNSON. T Th 9. *Baker 177.*

Lectures. A presentation of important chapters of organic chemistry and a discussion of classical researches in this field.

Students may register for any term separately.

**320. Advanced Organic Chemistry.** Either term. Credit two to six hours a term. Prerequisite, Chemistry 305 and 310. Dr. TALLMAN, Dr. CONNOR, and assistants. Day and hour to be arranged. Conference, F 12, *Baker 206. Baker 208.*

Laboratory practice. An advanced course in the preparation of organic compounds. The original literature is consulted, and the student is required to repeat some extended and important piece of work, and to compare his results with those published.

**340. Methods of Organic Analysis.** Either term. Credit four hours. Prerequisite, Chemistry 305 and 310. Dr. CONNOR and assistants. Lectures and conferences. T Th 10. *Baker 206.* Laboratory sections, T W Th 1:40-4, *Baker 350.* Laboratory work based upon Kamm: "Qualitative Organic Analysis."

With the permission of the instructor, students may register for three hours credit.

**365. Elementary Organic Chemistry.** Second term. Open only to students in the College of Home Economics. Lectures and laboratory, four hours. Prerequisite, Chemistry 101 and 105. Dr. TALLMAN and assistants. Lectures and written reviews, M W F 11, *Baker 207.* Laboratory M or T 1:40-4; *Baker 250.*

With the permission of the instructor, students may register for three hours credit, lectures only.

**375. Elementary Organic Chemistry.** First term. Lectures and laboratory, six hours credit. For students preparing for the study of medicine. Prerequisite, Chemistry 101, 105, 205, and 206 (or 210). Professor J. R. JOHNSON, Dr. TALLMAN, and assistants.

Lectures and written reviews, M W F S 9. *Baker 207.*

Laboratory sections: M W 1:40-4, *Baker 250.* Conference, M 1:40, *Baker 207.* T Th 1:40-4, *Baker 250.* Conference, T 1:40. *Baker 207.*

The student should determine the entrance requirement in Organic Chemistry for the particular medical school he wishes to enter. If more than six hours credit is required, he should register in Chemistry 305 and 310. Students may obtain 9 hours credit by taking Chemistry 305 throughout the year (6 hours) and Chemistry 310 (3 hours) during the first term.

**395. Research for Seniors.** Throughout the year. Credit two or more hours a term. Professor JOHNSON, Dr. TALLMAN, and Dr. CONNOR.

#### PHYSICAL CHEMISTRY

**405. Introductory Physical Chemistry.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 305 (or 375) and Physics 3 and 4. Professor BRIGGS. M W F 9. *Baker 7.*

Lectures. A systematic presentation of modern chemical theory in which special attention is paid to the following topics: Gases, liquids, and solids; the theory of solution; reaction velocity, catalysis, and chemical equilibrium; the Phase Rule; colloid chemistry; thermochemistry; and elementary electrochemistry. Problems in physical chemistry.

It is advisable, but not obligatory, that course 410 accompany this course.

**410. Introductory Physical Chemistry.** Throughout the year. Credit three hours a term. Prerequisite or parallel course, Chemistry 405. Professor BRIGGS and assistants. Laboratory sections: M T 1:40-4 or S 8-1, *Baker 1*.

Laboratory practice. Qualitative and quantitative experiments illustrating the principles of physical chemistry and including practice in performing physico-chemical measurements. An important feature of this course is the presentation of detailed reports based upon data obtained in the laboratory.

If only one term is taken, registration for the second term is advised.

**[415. Advanced Physical Chemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 405. Professor BANCROFT. T Th 11. *Baker 7*.

An exposition of the law of mass action in its application to chemical equilibrium and reaction velocities. Not given in 1933-34.]

**430. Applied Colloid Chemistry.** Throughout the year. Credit two hours a term. Open to candidates for the degree of Bachelor of Chemistry if they have completed Chemistry 405, to others only by special permission. Professor BANCROFT. T Th 10. *Baker 7*.

Lectures. The theory of colloid chemistry and its application in the arts.

**450. Applied Electrochemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 405. Professor BRIGGS. M W 12. *Baker 7*.

Lectures. The theory of electrolysis and electromotive force; electrolytic extraction and refining of metals; electrolytic manufacture of organic and inorganic compounds; theory and practice of storage cells; preparation of compounds in the electric furnace. Problems in electrochemistry.

**455. Applied Electrochemistry.** Throughout the year. Credit two hours a term. Prerequisite or parallel course, Chemistry 450. Professor BRIGGS and assistant. Day and hour to be arranged. *Baker 1-A*.

Laboratory practice. Qualitative and quantitative study of electrolysis; determination of electrical conductivity; potentiometric measurements; hydrogen ion concentration; determination of current and energy efficiencies in electrolytic and electrothermal work; electrolytic preparation of organic and inorganic compounds; tests of storage cells; preparation of compounds in the electric furnace; measurement of furnace temperatures.

**460. Theoretical Electrochemistry.** Throughout the year. Credit two hours a term. Prerequisite, Chemistry 405. Professor BANCROFT. T Th 11. *Baker 7*.

**465. Advanced Physical Chemistry.** Either term. Credit variable, but not to exceed six hours a term. Prerequisite, determined in each case by the Professor in charge. Professors BANCROFT and BRIGGS and assistants. Hour and work to be arranged. *Baker 94*.

Laboratory practice. Students may elect in mass law, reaction velocity, or efficiency measurements with special reference to course 415; in photo-chemistry, photography, or colloid chemistry with special reference to course 430; in conductivity, or electrometric determinations with special reference to course 460; in electrolytic, or electric furnace products with special reference to course 450; in the application of physical chemical methods to organic chemistry.

**495. Research for Seniors.** Throughout the year. Professors BANCROFT and BRIGGS. Credit two or more hours a term.

#### OPTICAL CHEMISTRY

**505. Introductory Chemical Spectroscopy.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 210 and 225 (or 205, 206, 220, and 221). Open to those who have completed or are taking Physics 31 and 32, or by special permission. Professor PAPISH, Mr. KETCHAM, and assistants.

Lectures and written reviews. T Th 9. *Baker 377*.

Laboratory sections: M T W Th F 1:40-4. *Baker 396*.

The construction and the use in chemical analysis of the spectroscope, polariscope, refractometer, colorimeter, and nephelometer. The laboratory instruction

is devoted to the training of the student in the use of these instruments in the solving of chemical problems.

Graduate students are advised to take this course the first term.

**510. Advanced Chemical Spectroscopy.** Either term. Credit two or more hours. Prerequisite, Chemistry 505. Professor PAPISH, Mr. KETCHAM, and assistants. Day and hour to be arranged. *Baker* 396.

Laboratory practice. The study of arc, spark, and absorption spectra and the application of spectroscopic methods to the identification of dyestuffs. Practice in one or more of the subjects mentioned may be selected by the student.

**520. Spectrographic Methods.** Either term. Credit one or more hours. Prerequisite, Chemistry 505. Professor PAPISH and Mr. KETCHAM. Laboratory hours to be arranged. *Baker* 396. Conference, hour to be arranged.

Laboratory practice. The application of photographic methods to arc, spark, and absorption spectroscopy. Practice is also given in the application of ultraviolet spectroscopy in chemical analysis.

**530. Introductory Chemical Microscopy.** Repeated in the second term. Credit three hours. Prerequisite, Chemistry 210 and 225 (or 205, 206, 220, and 221) and Physics 31 and 32, or by special permission. Professors CHAMOT and MASON, and assistants.

Lecture: M 10. *Baker* 377.

Laboratory sections: M T 1:40-4; T Th 9-11:30; Th F 1:40-4 (first term only). *Baker* 378.

Lectures and laboratory practice. The use of the microscope and its accessories; microscopic methods as applied to chemical and other scientific investigations; micrometry; the examination of crystalline compounds and industrial materials; recognition of textile and paper fibers, etc. The application of microscopic methods to quantitative analysis.

Graduate students are advised to take this course the second term.

**535. Microscopic Qualitative Analysis (Inorganic).** Either term. Credit two or more hours. Prerequisite, Chemistry 530. Professors CHAMOT and MASON, and assistants. Laboratory periods, to be arranged. *Baker* 378.

Laboratory practice in the examination and analysis of inorganic substances containing the more common elements with special reference to rapid qualitative methods and to the analysis of minute amounts of material.

**540. Microscopical Methods in Organic Chemistry.** Either term. Credit two or more hours. Prerequisite, Chemistry 530, and special permission. Professors CHAMOT and MASON, and assistants. Day and hour to be arranged. *Baker* 378.

Laboratory practice. General manipulative methods applicable to small amounts of material, crystallization procedures, determination of melting points and molecular weights; chemical tests and reactions for elements, radicals, and various types of organic compounds. Preparation of simple derivatives.

This course may be extended to cover the analytical reactions of the vegetable alkaloids, "strong drugs," or other special groups of organic substances.

**545. Metallography.** First term. Credit two hours. Prerequisite, Chemistry 530, or special permission. Professor MASON and assistants. Th F 1:40-4. *Baker* 384.

Laboratory practice, conferences and reports. An introduction to the principles and methods involved in the study of the structure of metals. The relation of microscopical appearances to thermal history and mechanical properties. Preparation of specimens for macroscopic and microscopic study. Metallographic microscopes and their use.

This course is planned approximately to parallel the lectures in the first term of course 705.

**[560. Advanced Chemical Microscopy.** Second term. Credit two hours. Hours to be arranged. Professor MASON.

Conferences and demonstrations. Theory and applications of instruments-accessories and methods used in critical microscopy, ultramicroscopy, photo,

micrography, and other special fields. Typical applications of microscopic methods in research and industry. Not given 1933-34.]

565. **Special Methods in Chemical Microscopy.** Either term. Credit one or more hours. Prerequisite, special permission. Professors CHAMOT and MASON. Day and hour to be arranged. *Baker* 378 and 382.

Laboratory practice may be elected in various fields such as photomicrography, ultramicroscopy, crystal studies, micro-manipulations, quantitative determinations, and the microscopy of industrial materials, textiles, papers, and foods.

595. **Research for Seniors.** Throughout the year. Credit two or more hours a term. Professors CHAMOT, PAPISH, and MASON.

#### SANITARY CHEMISTRY

*The courses in Sanitary Chemistry, which are under the direction of Professor CHAMOT, will not be offered in 1933-34.*

[615. **Introductory Sanitary Chemistry (Water).** Second term. Credit two hours. Prerequisite, Chemistry 305 (or 210, 225, and 375). T Th 11. *Baker* 377.

Lectures. Pollution of water; physical, chemical, bacteriological, and microscopical examination of water for household and municipal purposes; introduction to the methods of water purification, and water softening, and their control. Interpretation of analytical results and the preparation of sanitary surveys. Not given in 1933-34.]

It is advisable, but not obligatory, that Course 620 accompany this course.

[620. **Introductory Sanitary Chemistry (Water).** Second term. Credit two hours. Prerequisite or parallel course, Chemistry 615. Mr. FABER and assistant. Laboratory sections at hours to be arranged. *Baker* 352.

Laboratory practice. Laboratory exercises designed to illustrate the material presented in Course 615. Not given in 1933-34.]

[630. **Advanced Sanitary Chemistry (Water).** First term. Credit two hours. Prerequisite, Chemistry 615.

Laboratory practice to accompany this course may be elected under Course 635. Not given in 1933-34.]

[635. **Advanced Sanitary Chemistry.** Either term. Credit two or more hours. Prerequisite, to be determined in each case by the instructor in charge. *Baker* 352, 356, 358.

Laboratory practice.

Students who have had adequate preparation may elect work in any branch of sanitary chemistry. Among others, work along the following lines may be taken:

The bacteriology of water.

Continuation of work offered in courses 610 or 620.

The control of water purification.

Water softening.

The work in many cases may be arranged to meet the need of the individual student. Not given in 1933-34.]

[695. **Research for Seniors.** Throughout the year. Credit two or more hours a term. Professor CHAMOT. Not given in 1933-34.]

#### INDUSTRIAL CHEMISTRY

705. **Industrial Chemistry.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 405. Professor RHODES. W M F 10. *Baker* 177.

Lectures. A discussion of various typical processes of chemical manufacturing from the standpoint of: (a) available materials, their properties and limitations; (b) standard forms of apparatus used in chemical manufacturing; (c) properties and specifications of commercial chemicals; (d) computation of costs and profits in chemical manufacturing.

By special permission, candidates for the degree of Bachelor of Chemistry may be permitted to register for the second term of Course 705 in their junior year and to postpone a part of their elective hours until the senior year.

**710. Chemical Engineering.** Second term. Credit four hours. Prerequisite, Chemistry 405. Professor RHODES, Mr. LEWIS and assistants. Laboratory period, day and hour to be arranged. *Baker* B-78. Conference period, F 9. *Baker* 177.

The study in the laboratory, on a semi-plant scale, of the unit processes of chemical engineering, such as agitation, and mixing, filtration, fractional distillation, evaporation, drying, absorption of gases, and heat transfer.

**715. Selected Topics in Chemical Engineering.** Second term. Credit three hours. Prerequisite or parallel course, Chemistry 705. Professor RHODES. M W F 11. *Baker* 177.

Lectures. A discussion of special topics in industrial chemistry.

**725. The Chemistry of Fuels.** First term. Credit three hours. Prerequisite or parallel course, Chemistry 705. Professor RHODES. M W F 11. *Baker* 177.

Lectures. The chemistry of coal, coke, petroleum tars, and the fuel gases. Particular stress is laid upon the theoretical chemistry involved in the carbonization of coal, the gasification of coal, and the distillation and refining of petroleum and tar.

**730. Chemical Plant Design.** Throughout the year. Credit three hours a term. Prerequisite, Chemistry 705. Professor RHODES. Day and hour to be arranged.

Conferences and calculation periods. Practice in the calculation and design of chemical plant equipment.

**\*775. Engineering Chemistry.** Repeated in the second term. Credit two hours. Prerequisite, Chemistry 101. Not open to students who are candidates for the degree of Bachelor of Chemistry. Mr. LEWIS. M W 8. *Baker, Main Lecture Room.*

Lectures. Chemistry in its relations to engineering.

**[776. Chemistry of Pulp and Paper.** Second term. Credit two hours. Prerequisite, Chemistry 775. Open to students in Forestry, to others only by special permission. Mr. LEWIS. T Th 10. *Baker* 177.

Lectures. The chemistry of the manufacture of pulp and paper. Not given in 1933-34.]

**795. Research for Seniors.** Throughout the year. Credit two or more hours a term. Professor RHODES and Mr. LEWIS.

#### AGRICULTURAL CHEMISTRY

*Students will not be allowed to register in courses in Agricultural Chemistry until after they have taken and passed Chemistry 101 and 105 or their equivalent.*

**805. Introductory Agricultural Chemistry (Fertilizers, Insecticides, Soils).** First term. Credit two hours. Prerequisite, Chemistry 305 (or 375). Professor CAVANAUGH. T Th 11. *Baker* 302.

Lectures. The relation of chemistry to agriculture; an introduction to the study of plant growth, the composition and chemical properties of soils, fertilizers, amendments, insecticides, and fungicides.

**810. Introductory Agricultural Chemistry.** First term. Credit three hours. Prerequisite, Chemistry 205 and 220 (or 210 and 225). Professor CAVANAUGH and assistant. *Baker* 350.

Laboratory practice: day and hour to be arranged. Recitation: day and hour to be arranged. Practice in the methods used by the chemist in the control laboratories of the factory, of the Government, and of the Experiment Stations, where fertilizers, insecticides, fungicides, and soils are examined.

**815. Introductory Agricultural Chemistry (Foods and Feeds).** Second term. Credit two hours. Prerequisite, Chemistry 305 (or 375). Professor CAVANAUGH. T Th 11. *Baker* 302.

Lectures. Discussion of the sources, chemical composition, and properties of the principal foods and feeds such as cereals, fruits, animal products, and dairy products. Relation of methods of preservation and manufacture to the nutritive value of foods.

**820. Introductory Agricultural Chemistry.** Second term. Credit three hours. Prerequisite, Chemistry 205 and 220 (or 210 and 225). Professor CAVANAUGH and assistant. *Baker* 350.

Laboratory practice: day and hour to be arranged. Recitation: day and hour to be arranged. The methods of the Association of Official Agricultural Chemists are used in the examination and analysis of foods and feeding stuffs, such as milk and milk products, cereal products, canned vegetables, etc.

**\*825. Elementary Agricultural Chemistry.** Second term. Credit three hours. Prerequisite, Chemistry 101. Professor CAVANAUGH. M W F 12. *Baker* 377. Candidates for the degree of Bachelor of Chemistry may not receive credit for this course toward the degree.

Lectures. The relation of chemistry to agriculture, and an introduction to the study of the composition and chemical properties of plants, fertilizers, feed stuffs, insecticides, and fungicides.

**\*830. Elementary Chemistry of Food Products.** Second term. Credit two hours. Prerequisite, Chemistry 101. Professor CAVANAUGH. W F 10. *Baker* 377. Candidates for the degree of Bachelor of Chemistry may not receive credit for this course toward the degree.

Lectures. The chemical composition, physical and physiological properties, sources, and methods of manufacture of the principal food products.

**835. Advanced Agricultural Chemistry (Fertilizers, Insecticides, Soils).** Either term. Credit two or more hours. Prerequisite, Chemistry 810. Professor CAVANAUGH and assistant. Day and hour to be arranged. *Baker* 350.

Laboratory practice. Advanced work in the chemistry of soils, fertilizers, plant composition, insecticides, or fungicides. Special topics may be selected.

**840. Advanced Agricultural Chemistry (Foods and Feeds).** Second term. Credit two or more hours. Prerequisite, Chemistry 820. Professor CAVANAUGH. Day and hour to be arranged. *Baker* 350.

Laboratory practice. Special topics in the chemistry of foods and food preparations.

**895. Research for Seniors.** Throughout the year. Credit two or more hours a term. Professor CAVANAUGH.

#### SEMINARY

**905. Seminary.** Credit one hour. M 5. *Baker* 107.

Seniors who are candidates for the degree of Bachelor of Chemistry are required to attend this course both terms; they will register and receive credit for it the second term.

**1000. Non-Resident Lectures on the George Fisher Baker Foundation.** Credit two hours. T Th 12. *Baker* 177. Open to seniors in the course in Chemistry, and to juniors on special permission.

First term: **Crystal Chemistry, Geochemistry.** Professor V. M. GOLDSCHMIDT, Göttingen University, Göttingen, Germany.

Second term: **Crystal Structure and Methods of X-ray Analysis.** Structure of simple and complex inorganic salts. Aliphatic and aromatic organic crystals. X-ray optics. Professor W. L. BRAGG, University of Manchester, England.

#### THE CLASSICS

*Those whose major study is in Classics must complete twenty hours of non-starred courses in the Department, and fifteen hours, selected after conference with the adviser, in related subjects. Related subjects for this purpose are considered to be: Ancient History, the Comparative Study of Literature, modern foreign languages, particularly French and German, Ancient Philosophy.*

#### ARCHAEOLOGY, GREEK ART AND ANTIQUITIES

**1. History of Greek Sculpture.** Repeated in second term. Credit three hours. Professor ANDREWS. First term, M W F 10; second term, M W F 11. *Goldwin Smith Museum of Casts.*

3. **Greek Antiquities.** Repeated in second term. Credit three hours. Professor ANDREWS. First term, M W F 11; second term, M W F 10. *Goldwin Smith Museum of Casts.*

Pre-Greek art and civilization; Greek terra cottas, bronzes, pottery, and gems. Illustrated by the material in the Museum of Casts and by stereopticon views.

4a. **Greek Coins.** First term. Credit two hours. Professor ANDREWS. T Th 11. *Goldwin Smith Museum of Casts.*

4b. **Greek Architecture.** Second term. Credit two hours. Professor ANDREWS. T Th 11. *Goldwin Smith Museum of Casts.*

6. **Greek Epigraphy.** Credit two hours. Prerequisite, facility in reading Greek. Professor ANDREWS. Hours to be arranged after consultation. *Goldwin Smith 35.*

A study of Greek alphabets and inscriptions, chiefly from the large collection of squeezes owned by the department. For graduates and qualified undergraduates.

#### GREEK

\*1a. **Greek for Beginners.** Introduction to Homer's Iliad. Repeated in second term. Credit three hours. Professor CAPLAN. M W F 12. *Goldwin Smith 124.*

\*1b. **Homer's Iliad.** Continuation of Greek 1a. Repeated in second term. Credit three hours. Prerequisite, Greek 1a. First term: Assistant Professor HUTTON. M W F 12. *Goldwin Smith 120.* Second term: Mr. ———. M W F 12. *Goldwin Smith 128.*

\*2a. **Attic Greek.** *Plato, Selected Dialogues.* Repeated in second term. Credit three hours. Prerequisite, Greek 1b. First term: Mr. ———. M W F 11. *Goldwin Smith 134.* Second term: Professor JONES. M W F 12. *Goldwin Smith 120.*

\*2b. **Euripides: Iphigenia in Tauris and Alcestis; New Testament: Selections.** Repeated in second term. Credit three hours. Prerequisite, Greek 2a. First term: Mr. ———. M W F 12. *Goldwin Smith 134.* Second term: Professor JONES. M W F 11. *Goldwin Smith 120.*

5. **Greek Composition.** Throughout the year. Credit one hour. Prerequisite, Greek 1b or its equivalent. First term: Mr. ———; second term: Assistant Professor HUTTON. Th 2. *Goldwin Smith 124.*

\*7. **Greek Myths.** Illustrated lectures. First term. Credit two hours. Professor JONES. Open to sophomores and upperclassmen who have had a year of Greek, Latin, or Ancient History. T Th 10. *Goldwin Smith 120.*

\*8. **Lectures on Ancient Greece and Greek Life.** Second term. Credit two hours. Professor JONES. Open to sophomores and upperclassmen who have had a year of Greek, Latin, or Ancient History. T Th 10. *Goldwin Smith 120.*

17. **Aristophanes: Clouds; Sophocles: Oedipus Rex, Antigone.** Throughout the year. Credit three hours a term. Prerequisite, Greek 2b. Professor JONES. T Th S 12. *Goldwin Smith 120.*

[20. **Lyric Poetry; Aeschylus: Prometheus Vincitus; Theocritus; Demosthenes: Philippics.** Throughout the year. Credit three hours a term. Prerequisite, Greek 17. Not given in 1933-34.]

[22. **Plato: the Republic; Pindar: Selected Odes; Thucydides.** Throughout the year. Credit three hours a term. Prerequisite, Greek 20. For graduates and qualified undergraduates. Not given in 1933-34.]

25. **Advanced Greek Composition.** Second term. Credit one hour. Prerequisite, Greek 5. Mr. ———. Th 2. *Goldwin Smith 124.*

[30. **Lectures on Greek Literature: Greek Lyric and Choral Poetry from Alcman to Pindar.** First term. Credit two hours. Not given in 1933-34.]

[33. **Classical and Mediaeval Rhetoric.** Professor CAPLAN. Not given in 1933-34.]

34. **Readings in the Attic Orators.** For graduate students and qualified undergraduates. First term. Credit three hours. Professor JONES. M W F 11. *Goldwin Smith* 120.

### LATIN

*Those preparing to teach Latin in the secondary schools must take courses 16, 17, 21, 26 and prerequisites. For such students Greek and Archaeology, Greek Art, and Antiquities may be counted as related subjects in addition to those listed above in this Announcement under the heading, The Classics.*

*The required courses in Education should be begun in the sophomore year.*

\*1a. **Freshman Course: For Students Offering Three Units of Entrance Latin.** Throughout the year. Credit three hours a term. Section 1, Assistant Professor HUTTON. M W F 10. *Goldwin Smith* 120. Section 2, Mr. ———. T Th S 9. *Goldwin Smith* 124. Ovid; Virgil; Horace: Odes and Epodes.

\*1. **Freshman Course: For Students Offering Four Units of Entrance Latin.** Throughout the year. Credit three hours a term. Section 1, first term: Professor DURHAM. *Goldwin Smith* 128; second term: Professor CAPLAN. M W F 10. *Goldwin Smith* 124. Section 2, first term: Professor CAPLAN; second term: Mr. ———. M W F 11. *Goldwin Smith* 124. Cicero: De Senectute; Martial: Epigrams; Horace: Odes and Epodes.

\*2. **Sight Translation.** Throughout the year. Credit one hour a term. First term: Assistant Professor HUTTON. Second term: Professor CAPLAN. Th 12. *Goldwin Smith* 124.

Especially recommended as collateral work for those who are taking Course 1 or 1a, but open to all students.

\*8. **Terence; Catullus; Horace: Satires and Epistles; Tacitus: Agricola; Livy; Seneca: Epistles.** Throughout the year. Credit three hours a term. Prerequisite, Latin 1 or 1a. First term: Professor DURHAM. Second term: Assistant Professor HUTTON. M W F 9. *Goldwin Smith* 128.

[11. **Survey of Roman Poetry**, with interpretation of representative selections. First term. Credit two hours. Open to those who have taken or are taking Course 8 or Course 16. Professor DURHAM. Not given in 1933-34.]

12. **Epic Poetry: Ennius; Virgil: Georgics, The Last Six Books of the Aeneid; Lucan: Pharsalia.** Throughout the year. Credit two hours a term. Prerequisite, Latin 1 or 1a. Primarily for those who have taken or are taking Course 8. Professor DURHAM. M W 12. *Goldwin Smith* 128.

[16. **The Greater Republican Writers.** Throughout the year. Credit three hours a term. Prerequisites, Latin 8, 11, or 12. Plautus; Cicero; Lucretius. Not given in 1933-34.]

17. **Literature and History of the Early Empire.** Throughout the year. Credit three hours a term. Prerequisite, Latin 8, 11, or 12. Tacitus: Annals; Juvenal; Pliny's Letters; Suetonius. Assistant Professor HUTTON. M W F 11. *Goldwin Smith* 128.

21. **Latin Writing, Elementary Course.** Throughout the year. Credit one hour a term. Prerequisite, Latin 1 or 1a. First term: Mr. ———. T 12. *Goldwin Smith* 124. Second term: Assistant Professor HUTTON. T 12. *Goldwin Smith* 124.

[26. **Teacher's Training Course.** First term. Credit two hours. This course along with Education 4 and 4a will satisfy the requirement in Methods of the N. Y. State Provisional Professional Certificate. Professor DURHAM. Not given in 1933-34.]

[27. **Topography and Architectural Remains of Rome.** First term. Credit two hours. Professor DURHAM. Not given in 1933-34.]

30. **History of Roman Literature: Lectures and Readings.** Cicero, Life and Philosophical Works. Second term. Credit two hours. Assistant Professor HUTTON. T Th 11. *Goldwin Smith* 128.



Open to those who have taken or are taking Latin 8, 11, or 12. Other students will be admitted by permission of the instructor.

[33. **Classical and Mediaeval Rhetoric.** Professor CAPLAN. Not given in 1933-34.]

45. **Latin Writing, Advanced Course.** Throughout the year. Credit one hour. First term: Professor DURHAM. F 12. *Goldwin Smith* 128. Second term: Assistant Professor HUTTON. T 12. *Goldwin Smith* 124. For graduates, and for undergraduates who have taken Latin 21.

[48. **Vulgar Latin: Petronius: Cena Trimalchionis; Vulgar Latin Inscriptions, including Christian Inscriptions.** Second term. Credit two hours. Professor DURHAM. Not given in 1933-34.]

49. **Indo-European Philology; Sounds and Flexions of Latin; Italic Dialects.** First term. Credit two hours. Professor DURHAM. Primarily for graduate students. Hours to be arranged. *Goldwin Smith* 119.

[50. **Latin Epigraphy.** Second term. Credit two hours. Professor DURHAM. Primarily for juniors and seniors. The interpretation of selected Latin inscriptions; the republican inscriptions as illustrating the development of the language; the earlier imperial inscriptions for their historical content; Christian inscriptions for their bearing on Vulgar Latin. Not given in 1933-34.]

## COMPARATIVE STUDY OF LITERATURE

*For major work in the Comparative Study of Literature the following courses must be completed: (1) in the Comparative Study of Literature, a minimum of twelve hours in courses selected from 1, 2, 3, 4, and 5; (2) in related subjects, a minimum of twenty-four hours selected from courses in Greek, Latin, Ancient and Mediaeval History, Ancient and Mediaeval Philosophy, and English (but not starred courses in English).*

[1. **Modern Writers on Art: Ruskin, Tolstoy, and Nietzsche.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen with the permission of the instructor. Assistant Professor HUTTON. Not given in 1933-34; to be given in 1934-35.]

2. **English Translations of Greek and Latin Classics.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen. Professor COOPER. T Th 10-12. *Goldwin Smith* 127.

Rapid reading in the best translations, with emphasis upon Greek masterpieces; for example, the Iliad and the Odyssey, the tragedies of Sophocles, and several dialogues of Plato. Translations from the Latin will be chosen for the bearing of the original works upon modern literature. Students wishing to take the course must consult the instructor in advance.

3. **Old and Middle English.** Throughout the year. Credit three hours a term. Open to sophomores and upperclassmen, and to graduate students by special permission. Professor COOPER. M W F 10. *Goldwin Smith* 127.

A study of the foundations of the English language and literature, with emphasis upon literary aspects so far as a proper acquisition of linguistic knowledge shall permit. The work of the second term deals partly with Chaucer. Students may be admitted at the beginning of either term after consultation with the instructor.

The course will be of service to prospective teachers in the secondary schools.

4. **Principles of Literary Criticism.** Throughout the year. Credit three hours a term. Primarily for graduate students; open to upperclassmen by permission. Professor COOPER. W 11-12:50. *Goldwin Smith* 127.

A study of the chief theories of poetry, and chief kinds of literature, with illustrations drawn from writers both ancient and modern.

This and the following course are mainly designed for prospective college and university teachers.

5. **Dante in English.** Throughout the year. Credit three hours a term. Primarily for graduate students; open to upperclassmen by permission. Professor COOPER. M 11-12:50. *Goldwin Smith* 127.

Readings for the sake of literary and historical perspective, followed by a study of the Divine Comedy in the best English translations.

## ECONOMICS

For a major in Economics the following courses must be completed: (1) in Economics, course 1, or 2a and 2b, or the equivalent; twenty-four hours of advanced courses, including six hours in each of three groups; (2) in related subjects, fifteen hours, of which at least nine must be in one of the first four groups, selected from (a) Government 11, 20, 21, History 65a, 65b, Philosophy 7a; (b) Philosophy 5, 10, History 23, 32, 42; (c) Government 16, History 82 and 83, or 86 and 87, 89, 93, Philosophy 12; (d) Mathematics 2, 4a, 4b, 15; (e) Geology 203, 206, (f) Biology 1, Psychology 2, 10, 14, 15, Public Speaking 24.

Students particularly interested in Social Science are allowed an optional major of: (1) in Economics, course 1 or its equivalent, 50a and twenty-four hours of advanced courses of which a minimum of nine hours shall be in the Social Science group, with six hours in a second group; (2) in related subjects, fifteen hours of which nine must be in group (f) as given in the preceding paragraph.

Students who intend to register in Arts and Sciences and in the Law School will be held for twelve hours of advanced courses in Economics, of which six must be in one group, and twelve hours of related courses, of which six must be in one of the first four groups above.

Certain courses in Agricultural Economics and in Rural Social Organization may be counted in partial fulfillment of the major requirements in Economics or Social Science, but in no case may more than six of the required twenty-four hours be allowed for such courses; and, in each case, the specific approval of the adviser must be obtained before credit for such courses may be counted toward the upperclass requirement. Students must secure the approval of their adviser, and the permission of the Dean and of the instructor in charge of the course, before they may register for courses given outside the College.

Courses in statistics are offered in the Department of Agricultural Economics and the Department of Administrative Engineering.

## INTRODUCTORY COURSES

\*1. **Modern Economic Society.** Repeated in second term. Credit five hours. Assistant Professor O'LEARY. Daily except S 8, 9, 10, 11, 12.

A survey of the existing economic order, its more salient and basic characteristics, and its operation.

In the first term, the enrollment will be limited. Students should register, if possible, on the first day of registration. Assignment to sections will be made on registration days at *Goldwin Smith* 260.

\*2a. **Modern Economic Society.** First term. Credit three hours. Assistant Professor O'LEARY. M W F 8, 9, 11; T Th S 8, 9, 11.

This course and course 2b cover the same subject matter as course 1.

Enrollment will be limited. Students should register, if possible, on the first day of registration. Assignment to sections will be made on registration days in *Goldwin Smith* 260.

\*2b. **Modern Economic Society.** Second term. Credit three hours. Prerequisite course 2a. Assistant Professor O'LEARY. M W F 8, 9, 11; T Th S 8, 9, 11.

\*3. **Introduction to Economics.** For students in Engineering and Chemistry. Repeated in second term. Credit three hours. Assistant Professor O'LEARY. Hours to be announced.

An introduction to the more essential features of contemporary economic organization and to a number of economic problems about which a citizen in American society is required to formulate or express his opinion.

## FINANCE

**11. Money and Banking.** Repeated in second term. Credit three hours. Prerequisite, Economics I or its equivalent. Professor REED. M W F 10. *Goldwin Smith C.*

A study of the history and the theory of money and banking.  
Enrollment limited.

**12. Financial History of the United States.** Second term. Credit three hours. Prerequisite Economics 11. Assistant Professor O'LEARY. T Th S 10. *Goldwin Smith 256.*

A study of developing financial institutions, problems and legislation from 1700 to 1900. Monetary, banking, and public finance problems will be dealt with against the changing background of American economic organization.

**14. The Federal Reserve System.** First term. Credit three hours. Prerequisite, Economics 11. For seniors majoring in Economics, and graduate students. Professor REED. M W F 11. *Goldwin Smith 142.*

**15. Trade Fluctuations.** Second term. Credit three hours. Prerequisite, Economics 11 and 14. For seniors majoring in Economics, and graduate students. Professor REED. M W F 11. *Goldwin Smith 142.*

A study of the causes and effects of trade recessions and revivals, with an introduction to the methods of general forecasting.

**16. Money and Credit.** Throughout the year. Primarily for graduate students. Professor REED.

## ACCOUNTING

**21a. Accounting.** Repeated in second term. Credit three hours. Prerequisite, Economics I or 2a. Professor ENGLISH. T Th 8. *Goldwin Smith 142.* One recitation, hour to be arranged, and one practice period M 2-4. *Goldwin Smith 329.*

Theory of debit and credit; the journal and ledger; the development of books of original entry; analysis of income sheets and balance sheets.

**21b. Accounting.** Repeated in second term. Credit three hours. Prerequisite, Economics 21a. Professor ENGLISH. M W F 8. *Goldwin Smith 256.* One practice period a week. *Goldwin Smith 329.*

The issue and transfer of capital stock, bonds and their valuation, depreciation, reserves and reserve funds, sinking funds, analysis of income sheets and balance sheets.

**25. Cost Accounting.** First term. Credit two hours. Prerequisite, Economics 21b. Professor ENGLISH. Th 2-4. *Goldwin Smith 329.*

The purpose and methods of determining manufacturing costs.

**26. Accounting Theory and Problems.** Second term. Credit three hours. Prerequisite, Economics 21b, or its equivalent. Professor ENGLISH. M W F 9. *Goldwin Smith 329.*

A critical study of the fundamental principles underlying accounting procedure. The solution of typical problems in corporate consolidation, reorganization, and liquidation, and in other special fields.

## ORGANIZATION AND CONTROL OF INDUSTRY

**31. Corporation Finance.** First term. Credit three hours. Prerequisite, Economics 21a. Assistant Professor O'Leary. M W F 9. *Goldwin Smith 142.*

A study of the financial problems of the business corporation from the points of view of the management, of the investor, and of the public.

**32. Industrial Combinations.** Second term. Credit three hours. Prerequisite, Economics I or its equivalent. Professor HOMAN. M W F 10. *Goldwin Smith 256.*

A study of the concentration of industrial control, including a survey of the trust movement, trade associations, anti-trust legislation and legal decisions, and the present problem of public regulation of industry and trade.

**33. Public Utilities.** First term. Credit three hours. Prerequisite, Economics I or its equivalent. Professor HOMAN. M W F 10. *Goldwin Smith 256.*

A study of the special economic situation of the public service industries and of problems relating to their organization and control.

**34. Transportation and Communication.** First term. Credit three hours. Open to upperclassmen who have credit for Economics 21a. Assistant Professor O'LEARY. T Th S 9. *Goldwin Smith* 256.

Public policy concerning methods of organization and administration of transportation.

**36. Taxation.** Second term. Credit three hours. Open to juniors and seniors who have credit for Economics 1 or its equivalent. M W F 11. *Farm Management Building* 102. Assistant Professor KENDRICK.

The emphasis of the course is on state and local problems connected with rural taxation. Among the subjects considered are: the growth of expenditures; the rise of modern tax problems; how various governmental divisions of New York and other States get their tax revenues; the general-property tax and its administration, and the special cases of personal-property, farm, and forest taxation; mortgage taxes; taxation of cooperatives; income, inheritance, and gasoline taxes; proposals for tax reform; problem of a proper distribution of the tax burden among the various state and local governmental units. Fee for materials furnished, \$2.

#### LABOR AND INDUSTRIAL RELATIONS

**41. Labor Conditions and Problems.** First term. Credit three hours. Prerequisite, Economics 1 or its equivalent. Assistant Professor MONTGOMERY. M W F 9. *Goldwin Smith* 256.

An introduction to the field of Industrial Relations and a survey of the more basic labor problems growing out of modern economic arrangements.

**42. Trade Unionism and Collective Bargaining.** Second term. Credit three hours. Prerequisite, Economics 41 or the consent of the instructor. Assistant Professor MONTGOMERY. M W F 9. *Goldwin Smith* 142.

A study of the origins, philosophic basis, aims, and policies of trade unions and of collective bargaining in selected industries.

**[44. Labor Management and Personnel Problems.** Second term. Credit three hours. Prerequisite, Economics 41 or the consent of the instructor. Assistant Professor MONTGOMERY. Not given 1933-34.]

**45. The Economics of Dissent.** First term. Credit two hours. Open to upperclassmen with the consent of the instructor. Assistant Professor MONTGOMERY. W 2-4. *Goldwin Smith* 264.

A study of the literature of social protest; of unorthodox or dissenting economic doctrines; and of the various types of economic organization that have been proposed or attempted, including the Utopias, Marxian Socialism, Collectivism, Anarchism, the Single Tax, Syndicalism, Guild Socialism, Fabian Socialism, and Communism.

**46. Legal and Constitutional Aspects of Labor Problems and Welfare Legislation.** Second term. Credit two hours. Consult the instructor before registering. Assistant Professor MONTGOMERY. W 2-4. *Goldwin Smith* 264.

A study of the legal aspects of trade union objectives and methods and of the theory and practical operation of the more important types of social insurance. Among the topics treated: legal theories underlying labor laws; statutory enactments affecting trade unions; injunctions, damage suits, criminal prosecutions, restrictions upon employers; conciliation, arbitration, mediation, unemployment insurance, health insurance, workmen's compensation, old age pensions, the legal minimum wage.

**49. Special Problems in Industrial Relations.** Primarily for graduate students. Assistant Professor MONTGOMERY.

#### SOCIAL SCIENCE

**\*50a. Introduction to Social Science.** First term. Credit three hours. Assistant Professor WOODWARD. T Th 9 and an hour to be arranged. *Goldwin Smith* C.

A study of racial and cultural origins and of the factors determining organic evolution and cultural development.

50b. **Introduction to Social Science.** Second term. Credit three hours. Prerequisite, Economics 50a. Assistant Professor WOODWARD. T Th 9 and an hour to be arranged. *Goldwin Smith C.*

The social development of human personality; the behavior of crowds; social control and social progress.

51. **Population Problems.** First term. Credit three hours. Prerequisite, Economics 50b. Consult the instructor before registering. Assistant Professor WOODWARD. T Th S 11. *Goldwin Smith 264.*

The problem of population numbers and quality; the American immigration problem; the problem of race relations in America.

54. **The Family.** Second term. Credit three hours. Prerequisite, Economics 50b and the consent of the instructor. Assistant Professor WOODWARD. T Th S 11. *Goldwin Smith 264.*

The historical backgrounds of the modern American family; current disorganization of the American family as a social problem; the problem of individual adjustment to current family mores.

Fee for materials, \$3.

#### INTERNATIONAL TRADE AND FINANCE

71. **International Trade.** First term. Credit three hours. Prerequisite, Economics 1, or its equivalent. Assistant Professor SOUTHARD. T Th S 11. *Goldwin Smith 142.*

The theory of international trade; foreign trade of the United States; international commercial policies.

72. **International Finance.** Second term. Credit three hours. Prerequisite, Economics 1 and 71. Assistant Professor SOUTHARD. T Th S 11. *Goldwin Smith 142.*

Foreign exchange; balance of payments of the United States; the international movement of capital; the internationalization of industry.

#### ECONOMIC HISTORY AND THEORY

81. **Economics of Enterprise.** First term. Credit three hours. Primarily for seniors majoring in Economics. Assistant Professor KENDRICK. T Th S 10. *Goldwin Smith 256.*

An analytical treatment of the theory of prices and incomes.

82. **National Wealth and Income.** Second term. Credit three hours. Primarily for seniors majoring in Economics. Professor HOMAN. T Th S 10. *Goldwin Smith 264.*

A study of some major economic problems, designed to illustrate the interrelations among the various parts of our economic system, and to assist in appraising proposals for economic reform.

83a. **The Development of Economic Institutions.** First term. Credit three hours. Prerequisite, Economics 1 or its equivalent. Assistant Professor JOHNSON. M W F 11. *Goldwin Smith 256.*

A study of the evolution of economic institutions before the Industrial Revolution, and an examination of the intellectual movements which helped to develop these institutions.

83b. **The Development of Economic Institutions.** Second term. Credit three hours. Prerequisite, Economics 1 or its equivalent. Assistant Professor JOHNSON. M W F 11. *Goldwin Smith 264.*

A continuation of course 83a from the Industrial Revolution to the present day.

87. **Contemporary Economic Thought.** Throughout the year. Primarily for graduate students. Professor HOMAN. Hours to be arranged.

## INFORMAL STUDY AND HONORS IN ECONOMICS

The direction of informal study in Economics, and the assistance of candidates for the degree with Honors in Economics is in charge of Assistant Professor JOHNSON.

## EDUCATION

For a major in Education (which must comprise at least thirty-six hours), the following courses must be completed: (1) in Education, eighteen hours including courses 1, 2, and 3 or 13; (2) in related subjects fifteen hours selected according to the student's interests and needs from Philosophy, Psychology, Rural Education, teachers' courses in other departments, Biology 303 and 307.

Psychology 1 is prerequisite to all courses in Education.

1. **Educational Psychology.** Either term. Credit three hours. Lectures and recitations. First term, Assistant Professor FREEMAN. M W F 11. *Goldwin Smith* 234. Second term, Professor OGDEN, Section I, T Th S 11, *Goldwin Smith* 134; Assistant Professor FREEMAN, Section II, M W F 10. *Goldwin Smith* 234.

A study of functional psychology with special reference to the learning process and its application to educational theory and practice. Students must apply at *Goldwin Smith* 246 for assignment to sections.

2. **Principles of Secondary Education.** Second term. Credit three hours. Prerequisite, Education 1. Section I, M W F 2. Professor JORDAN. *Goldwin Smith* 234. Section II, T Th S 9. Assistant Professor FREEMAN. *Goldwin Smith* 234.

The nature and significance of education; biological and psychological foundations; the secondary school as a social institution; educational ideas and values; the curriculum. Students who elect course 2 must apply at *Goldwin Smith* 246 for assignment to sections.

3. **History of Education.** (a) (Greek, Roman, and Early Medieval.) First term. Credit two hours. Open to upperclassmen and graduates only. Professor LAISTNER. (See History 7.) (b) (Late Medieval and Modern). Second term. Credit two hours. Open to upperclassmen and graduates only. Professor SMITH. (See History 36.)

4. **Method and Procedure in High School Teaching.** First term. Credit three hours. For seniors only. Professor JORDAN. M W F 11. *Goldwin Smith* 264. M W F 3. *Goldwin Smith* 256.

Designed for students who expect to teach in secondary schools. The relation and duties of high school teachers to their students, to the community, and to the state; methods of class management and types of recitation. Observation of actual high school classes required.

4a. **Observation and Practice in High School Method.** First term. Credit one hour. For seniors only. Professor JORDAN, Mr. HULSE, and Miss BESIG. M 4. *Goldwin Smith* 256.

Planned to be taken coincidentally with course 4, and required of students desiring to meet the New York State requirements for the provisional professional certificate.

4b. **Practice in High School Method.** Either term. Credit two or three hours. For seniors only. Prerequisite, courses 4 and 4a. Mr. HULSE and Miss BESIG. M 4. *Goldwin Smith* 256.

This course is limited to students needing two additional hours credit in observation and practice to meet State education requirements. Enrollment is limited to students specifically recommended by the Department of Education. The work will involve daily observation and practice in the Ithaca High School under supervision of selected teachers and under the general direction of the Department of Education. Conferences will be held once a week with the instructor in charge.

5. **Theory of Behavior.** Second term. Credit two hours. Primarily for graduate students; open to upperclassmen by permission. Professor OGDEN. W 2-4. *Goldwin Smith* 248.

The nature of behavior; learning, insight, personality and character; educational applications.

**7. Mental and Educational Measurements.** First term. Credit three hours. Prerequisite, Education 1 or equivalent. Assistant Professor FREEMAN. T Th S 9. *Goldwin Smith* 225.

The nature of intelligence. History of the development of individual and group tests of intelligence; principles underlying their formation and application; the use of tests of intelligence in school problems and in fields outside the school. The theory, construction, and use of educational tests. Demonstration in administering tests.

**8. Experimental Education.** Either term. Credit and hours to be arranged. Consent of the instructor is required. Education 7 or its equivalent should normally precede this course. Assistant Professor FREEMAN. *Goldwin Smith* 248.

Problems of experimental education; the application of psychological and statistical methods to problems in educational psychology; chief results and bearings.

**10. City School Administration and Supervision.** Throughout the year. Credit two hours a term. Prerequisite, Education 1. Professor JORDAN. M W 9. *Goldwin Smith* 248.

Principles of administration and supervision of state and city school systems, involving problems of evaluation and improvement of teaching, and of the subject matter in the public schools. The course will be adapted to the particular needs of the class.

**11. High School Administration.** Second term. Credit two hours. For seniors, graduates, and other qualified students. Professor JORDAN. W F 3. *Goldwin Smith* 236.

Principles relevant to administration of the senior and junior high school; classification of pupils; program making; curriculum problems; the principal as supervisor; pupil guidance; duties of the principal in both large and small high schools.

**[12. The Junior High School.** Throughout the year. Credit two hours a term. For seniors, graduates and other qualified students. Professor JORDAN. W 4-6. Not given in 1933-34.]

Psychological, biological, and pedagogical bases for the Junior High School; fundamental principles; organization and administration; curricular content in detail; methods of instruction.

**13. History of American Education.** First term. Repeated second term. Credit three hours. Prerequisite, Education 1, or its equivalent. Mr. HULSE. T Th S 10. *Goldwin Smith* 142.

A survey of educational change in the United States from the beginning of the seventeenth century to the present, with special emphasis on public schools, and consideration of the religious, economic, political, and social factors affecting education. European influences throughout the period will also be considered briefly.

**17. Mental Development.** First term. Credit two hours. Prerequisite, Education 1 or its equivalent. Assistant Professor FREEMAN. W 2-4. Given in alternate years.

A course in child psychology, dealing with the facts of mental growth and their interpretation.

**[18. Individual Differences.** First term. Credit two hours. Prerequisite, Education 1 or its equivalent. It is desirable, though not required, that Education 7 precede this course. Assistant Professor FREEMAN. W 2-4. Given in alternate years. Not given in 1933-34.]

Study of the nature, causes, and consequences of individual differences in abilities, interests, and achievement.

**20. Seminary in Education.** First term. Credit two hours. Primarily for graduate students; open to upperclassmen by permission. Assistant Professor FREEMAN. M 4-6. *Goldwin Smith* 248.

Topics relevant to educational theory.

**21. Seminary in Education.** Second term. Credit two hours. Admission by permission of the instructor. Professor JORDAN. M 4-6. *Goldwin Smith* 248.

Topics developing from historical and current problems of educational practice, especially as related to administration and conduct of the public school system and of the university. Primarily for graduate students.

*The attention of students is called to the Announcement of the Graduate School of Education.*

## ENGLISH

*For a major in English the following courses must be completed: (1) in English, course 3, six hours of sophomore courses, and twenty-one hours of advanced courses; (2) in related subjects, eighteen hours selected, with the approval of the adviser, from: Greek and Latin, all courses; French, German, Italian, all unstarred courses (but in particular cases starred courses may be accepted); Public Speaking 10, 12, 23, 30, 31, 41, 49, 66; History 7, 23, 43, 44, 66, 67, 68, (and for students of American Literature, 82, 83, 86, 89); Philosophy A, 1, 4, 5, 7, 7a, 8, 9, 18, 18a, (and for students of American Literature, 12); Music 10, 12, 13; Scandinavian 1, 4 (for students of English Philology, whose attention is also called to Latin 49, German 42, 43, 48).*

*The Department will make provision, as a part of the work toward the major in English, for informal study for seniors who have maintained an average of 85 in their English courses.*

*The Department of English strongly recommends that students who intend to choose English as their major subject take English History in the first or second year.*

*The Department recommends that students who are planning to teach English take English 32 and 98.*

*The Department calls attention to Public Speaking 1, 10, 30, and 41, which afford the training in Oral English required of teachers of English in the secondary schools.*

**\*1. Elementary Composition and Literature.** Throughout the year. Credit three hours a term. Messrs. BALDWIN, ADAMS, BISSELL, ELSON, GIDDINGS, HARRIS, MULLER, TENNEY, and WENTWORTH. M W F 8, 9, 10, 11, 12; T Th S 8, 9, 10, 11. Rooms to be announced.

This course is open to underclassmen in Agriculture, Architecture, Chemistry, and Home Economics who have satisfied the entrance requirements in English. A study of composition in connection with the reading of representative works in English literature. Students who have not taken the course in the first term may enter in the second term.

Students who elect English 1 must apply at *Roberts* 292 on Monday, Tuesday, or Wednesday of registration week for assignment to sections. Registration in the course is in charge of Mr. Baldwin.

**\*3. Introductory Course in Composition and Literature.** Throughout the year. Credit three hours a term. Messrs. SMITH, ADAMS, ELSON, FRENCH, HARRIS, MARX, MULLER, SHORT, TENNEY, and WEITZMANN. M W F 8, 9, 10, 11, 12; T Th S 8, 9, 10, 11. Rooms to be announced.

Chaucer, Shakespeare, Boswell, Pope, Browning, Thackeray; practice in composition, with conferences. Designed for freshmen who are candidates for the degree of Bachelor of Arts. Students who elect English 3 must apply at *Goldwin Smith* A on Monday, Tuesday, or Wednesday of registration week for assignment to sections. The course is in charge of Professor Smith.

## FOR SOPHOMORES

**\*20. Prose and Composition.** Throughout the year. Credit three hours a term. Prerequisite, English 1, 3, or 21. M W F 9, Dr. MARX, *Goldwin Smith* 164; M W F 10, Assistant Professor FRENCH, *Goldwin Smith* 164; M W F 11, Professor MONROE, *Goldwin Smith* 164; M W F 12, Professor NORTUP, *Goldwin Smith* 164; T Th S 9, Professor MONROE, *Goldwin Smith* 164; T Th S 10, Assistant Professor NUNGEZER, *Goldwin Smith* 164.

Reading of nineteenth century prose; instruction and practice in composition.

**\*21. Composition and Literature.** Throughout the year. Credit three hours a term. For students in the College of Engineering. Professor SIBLEY. M W F 12. Room to be announced.



22. **Nineteenth Century Poetry.** Throughout the year. Credit three hours a term. Prerequisite, English 1 or 3. Professor BROUGHTON. M W F 11. *Goldwin Smith A.*

\*25. **History of English Literature.** Throughout the year. Credit three hours a term. Prerequisite, English 1 or 3. Professor HEBEL and Mr. LINDSAY. T Th 10 and an hour to be arranged. *Goldwin Smith A.*

Two lectures a week, and assigned readings to be discussed in recitation. First term: from *Beowulf* to 1700; second term, from 1700 to 1900.

#### FOR UPPERCLASSMEN AND GRADUATES

32. **Old English.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates. Professor MONROE. M W F 9. *Goldwin Smith 162.*

Old English grammar. Reading of selections from the *Old English Chronicle*, King Alfred, Aelfric, and other representative prose texts, and of the simpler poetry. A part of the second term is devoted to early Middle English, with supplementary reading on the growth of the language.

37. **Chaucer.** First term. Credit three hours. Open to upperclassmen and graduates. Assistant Professor FRENCH. M W F 12. *Goldwin Smith 162.*

A literary study of *The Canterbury Tales* and a few of the minor poems.

38. **Middle English Metrical Romances.** Second term. Credit two hours. Open to upperclassmen. Assistant Professor FRENCH. T Th 2:30-4.

A study of early English fiction.

42. **The English Drama to 1642.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates. Assistant Professor NUNGEZER. M W F 11. *Goldwin Smith 156.*

First term: the origin of the drama; mysteries, saint plays, moralities, folk plays, interludes; the rise of professional actors; the development of stage-craft; the court plays; the academic drama. Second term: the erection of permanent playhouses; the contemporaries and successors of Shakespeare; the suppression of acting.

44. **Sixteenth Century Literature.** Throughout the year. Credit three hours a term. Primarily for graduate students; open to seniors by permission. Assistant Professor NUNGEZER. M W F 12. *Goldwin Smith 338.*

A study of the non-dramatic literature of England from the beginning of the Renaissance to the close of the reign of Elizabeth.

46. **Shakespeare.** Throughout the year. Credit three hours. Prerequisite, twelve hours of English. Professor STRUNK. M W F 10. *Goldwin Smith 156.* First term: the chief comedies; second term: the chief tragedies.

48a. **The English Renaissance.** Throughout the year. Credit three hours a term. Open to upperclassmen who have maintained an average of 85 in their courses in English; limited in number to eight students. Students enrolling in the course must obtain the instructor's permission. Professor HEBEL. Room and hour to be arranged.

For the exact nature of the subject-matter, which will vary from year to year, consult the instructor.

50. **Seventeenth Century Literature.** First term. Credit three hours. Open to upperclassmen and graduates. Professor HEBEL. T Th S 11. *Goldwin Smith 234.*

A study of English literature, history, and philosophy of the seventeenth century; Bacon, Donne, Herbert, Vaughan, Traherne, Jonson, Herrick, Carew, Suckling, Burton, Browne, Walton, Pepys.

52. **Milton.** Second term. Credit three hours. Open to upperclassmen and graduates. Professor HEBEL. T Th S 11. *Goldwin Smith 234.*

A study of Milton's poetry and selections from his prose.

54. **Eighteenth Century Poetry.** Throughout the year. Credit two hours a term. Open to upperclassmen. First term: Professor MONROE; second term: Professor PRESCOTT. T Th 10. *Goldwin Smith 156.*

English poets of the Restoration and the eighteenth century; Dryden, Pope, Thomson, Gray, Collins, Goldsmith, Cowper, and Burns; the lesser English and Scottish poets; beginnings of the English Romantic movement.

56. **Eighteenth Century Prose.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates. Professor BROUGHTON. M W F 9. *Goldwin Smith* 156.

A study of the leading prose writers, including the novelists, of the century: Defoe, Swift, Richardson, Addison, Steele, Goldsmith, Fielding, Johnson, Smollett, Burke, Sterne.

58. **Biography.** Throughout the year. Credit two hours. Open to upperclassmen. Professor SMITH. T Th 12. *Goldwin Smith* 156.

First term: Plutarch, St. Francis, Vasari, Franklin. Second term: Dr. Johnson and his circle.

64. **Byron and Shelley.** First term. Credit two hours. Open to upperclassmen who have passed twelve hours of English with a grade of A or B. Professor PRESCOTT. T Th 12. *Goldwin Smith* 162.

In 1933-34, a study of Byron's life, his principal works, and his influence.

68. **Victorian Literature.** First term. Credit three hours. Open to upperclassmen and graduates. Professor NORTHUP. M W F 9. *Goldwin Smith* 134.

Lectures on the chief characteristics and literary tendencies of the period; studies of Browning, Tennyson, and the greater writers of prose.

69. **Victorian Literature.** Second term. Credit three hours. Open to upperclassmen and graduates. Professor NORTHUP. M W F 9. *Goldwin Smith* 134.

Studies of Arnold, Morris, Swinburne, and some other poets, and of the greater writers of fiction.

70. **American Literature.** First term. Credit three hours. Open to seniors and graduates. Professor PRESCOTT. M W F 12. *Goldwin Smith* 156.

American literature of the colonial and revolutionary periods; the growth of literary independence; Irving, Bryant, and Cooper.

72. **American Literature.** Second term. Credit three hours. Prerequisite, English 70. Open to seniors and graduates. Professor PRESCOTT. M W F 12. *Goldwin Smith* 156.

American prose and poetry of the nineteenth century.

73. **The Modern Novel.** Throughout the year. Credit three hours a term. Open to upperclassmen after consultation with the instructor. M W F 2. Dr. MULLER. *Goldwin Smith* 160.

A study of the origins of the modern novel and representative works of English, American, and Continental novelists.

74. **The English Language.** Second term. Credit two hours. Open to upperclassmen. T Th 10. Professor MONROE. *Goldwin Smith* 162.

The development of the English language, with consideration of language in general, including elementary phonetics. Recitations, lectures, collateral reading. This course does not require previous knowledge of Old and Middle English.

76. **English Usage and Style.** Throughout the year. Credit three hours a term. Open to seniors and to a limited number of juniors who have received a mark of 85 or better in English in the previous term. Professor STRUNK. T Th S 9. *Goldwin Smith* 160.

The first term is devoted chiefly to composition. The second term includes, along with composition, the study of the theory of good English, the study of words, idioms, and pronunciation, and related topics.

78. **Short Story Writing.** Throughout the year. Credit three hours a term. Open to upperclassmen after consultation with the instructor. Professor SMITH. T Th S 10. *Goldwin Smith* 160.

84. **English Poetry.** First term. Credit two hours a term. Open to upperclassmen after consultation with the instructor. Professor PRESCOTT. T Th 10. *Goldwin Smith* 162.

A general course in the nature of poetry and of poetic forms with reading of illustrative poems.

**90. Dramatic Structure.** Throughout the year. Credit three hours a term. Open to seniors and graduate students. Professor STRUNK. T Th S 11. *Goldwin Smith* 156.

Reading, in the first term of Greek, Elizabethan, and classical French plays; in the second term, of modern and contemporary plays; study of the principles of dramatic art.

**98. Teachers' Course.** Second term. Credit two hours. Open to seniors and graduates. Professor NORTHUP. T Th 12. *Goldwin Smith* 227.

Lectures, readings, and conferences on the teaching of English in the secondary schools.

## GEOLOGY

For a major in Geology, the following courses must be completed: (1) in Geology, not less than twenty-four hours of advanced courses; (2) in related subjects, fifteen hours to be selected from the following list according to the nature of the major: (a) General Major: Chemistry 101, 105; Physics 3, 4; Astronomy 180, 181; Meteorology 1, 2; Zoology 1, 16; Philosophy 15; Mathematics 15; Botany 1; Soils 1. (b) Structural Geology: Chemistry 101, 105, 210, 225, 250, 450, Physics 3, 4, 11, 12, 60, 61, 62; Mathematics 3, 4a, 4b; Astronomy 180, 181. (c) Physiography and Glaciology: Chemistry 101, 105; Astronomy 180, 181; Physics 3, 4; Meteorology 1, 2; Philosophy 15; Biology 20. (d) Geography: Economics 1, 45, 50a, 50b, 51, 82; History 82, 83, 86, 87, 89. (e) Mineralogy and Petrography: Chemistry 130, 135, 205, 206, 210, 220, 221, 225, 405, 410, 505, 530; Mathematics 1, 2, 3, 4, 41; Physics 3, 4, 60, 61, 62; (f) Historic Geology and Paleontology: Biology A, Botany 1, Zoology 1, 16, 8; Astronomy 180, 181; Physics 3, 4; Chemistry 101, 105; Mathematics 3; Philosophy 15. (g) Economic Geology: Chemistry 220, 405, 505, 530; Physics 3, 4; Economics 1, 3; Mathematics 3; Zoology 1; Botany 1; Soils 1.

Other courses subject to approval of branch of department concerned.

**\*A. General Geology.** Throughout the year. Credit three hours a term, but second term cannot be taken before the first. Professors RIES, VON ENGELN, NEVIN, DR. BURFOOT, MR. CONANT, MR. RAPPENECKER. Lectures, M W 9; T Th 9; or T Th 11; *McGraw*. Laboratory, M T W or F afternoons 1:40. *McGraw*.

Students must register at the Geology office, *McGraw Hall*, for lecture and laboratory assignments. The course comprises an introduction to the various branches of geological science, lithologic, physiographic, structural, glacial, economic, and historic geology in its broader aspects. Methods of geological and physiographic study in the field and laboratory are emphasized.

**\*100. Introductory Geology.** Repeated in the second term. Credit three hours. Professor RIES, DR. BURFOOT, MR. MEGATHLIN, MR. CONANT. Lectures, T Th 9, both terms. *Sibley Dome*. Laboratory, M W Th F afternoons, 1:40, or (S) 8 if necessary. *McGraw*.

Students must register for laboratory assignment at *Geology Laboratory, McGraw*, before beginning the course. The fundamental principles of this branch of science. The inorganic aspects of the subject are emphasized more than the organic. This course cannot be elected by Arts and Sciences students for satisfaction of new science group requirement.

## DYNAMIC AND STRUCTURAL GEOLOGY

**\*101. Larger Aspects of Geology.** Second term. Credit two hours. Assistant Professor NEVIN. Lectures, M W 10. *McGraw*. Designed especially for students who desire to become acquainted with some of the interesting problems of earth science, and their relation to the other sciences.

**102. Structural Geology.** First term. Credit three hours. Prerequisite, Geology A or the equivalent. Assistant Professor NEVIN. Lectures, T Th 11. Laboratory, T 1:40. *McGraw*.

A study of geologic structures and their causes. Part of the laboratory periods will be spent in the field.

**103. Sedimentation.** First term. Credit three hours. Prerequisite, Geology A. Assistant Professor NEVIN. Lectures, T Th 10. Laboratory, Th 1:40. *McGraw.*

Part of the laboratory periods will be spent in the field. This course is devoted to a study of the principles involved in the formation of sediments. Registration by permission.

**106. Special Work in Sedimentation, Structural and Petroleum Geology.** Throughout the year. Credit variable. Prerequisites, variable. Assistant Professor NEVIN. Hours to be arranged. *McGraw.*

For advanced students and graduates. Original investigation adapted to the needs of the student.

**107. Geologic Mapping.** Given in the Summer Field School.

A discussion of the fundamental methods used in geologic mapping, together with practical work in the field. For students majoring in Geology.

#### PHYSICAL GEOGRAPHY

**200. Geomorphology.** First term. Credit three hours. Prerequisite, Geology A. Professor VON ENGELN and Mr. RAPPENECKER. Lectures, T Th 10. Laboratory, Th 1:40. *McGraw, Physiography Laboratory.*

The technology of geomorphological description and the interpretation of land forms with regard to process and stage and the adjustment of topography to structure.

**\*201. Physiography of the Lands and Oceanography.** First term. Credit three hours. Professor von Engeln. M W F 11. *McGraw, Physiography Laboratory.*

Intended for students who desire a scientific appreciation of the inorganic elements of the landscape.

**\*203. Geography of North America.** First term. Credit three hours. Mr. RAPPENECKER. M W F 10. *McGraw, Geology Lecture Room.*

Regional and economic geography of North America; discussion of the influence of the physiographic features and natural resources on the settlement and development of the various sections of the continent.

**204. Representation of the Relief of Land Forms.** Second term. Credit three hours. Not given for less than three students. Registration only by permission. Intended chiefly for students majoring in Geology. Mr. RAPPENECKER. Laboratory hours to be arranged. *McGraw, Physiography Laboratory.*

The first half of the term will deal with the construction and casting of plaster models of selected areas. The second half of the term will be devoted to instruction in drawing of block diagrams.

**205. Glaciers and Glaciation.** Second term. Credit three hours. Prerequisite, Geology A. Professor VON ENGELN and Mr. RAPPENECKER. Lectures, T Th 10. Laboratory, T 1:40. *McGraw.*

Living glaciers and the phenomena of the glacial period. Students are required to have one or more Saturdays free for all-day excursions in the Spring. Mapping and interpretation of glacial deposits.

**206. Commercial Geography.** Second term. Credit three hours. Professor VON ENGELN and Mr. RAPPENECKER. Lectures, M W F 10. *McGraw, Geology Lecture Room.* Not open to freshmen.

The geographic factors affecting production and distribution of commodities, historically and in modern times. Natural geographic regions in relation to their past and prospective exploitation. Nature of city sites and the geographic conditions of city growth, organization, and functioning. It is desirable to have had an elementary course in Economics or in Geology before taking this course.

**208. Advanced Physiography, Experimental and Research Work.** Credit variable. Registration by permission. Professor VON ENGELN.

**209. Seminary.** First or second term. Credit two hours. For graduate students and seniors with requisite preparation. Registration by permission. Professor VON ENGELN.

## MINERALOGY AND PETROGRAPHY

\*311. **Elementary Mineralogy.** Repeated in second term. Credit three hours. Prerequisite, Chemistry 101. Dr. BURFOOT and Mr. ROSEVEAR. Lectures: first term W F 10; second term M W 12. Laboratory: first term W or Th 1:40; second term Th or F 1:40. Additional hours if necessary. *McGraw Geology Lecture Room.*

For beginners who desire a general knowledge of the commonest minerals, their uses, the properties by which they are recognized, and their significance as constituents of the earth's crust. In the laboratory, various determinative methods are used for identifying the minerals.

312. **Crystallography.** First term. Credit three hours; if taken after 311, credit two hours. Prerequisite, Physics 3. Dr. BURFOOT. Lectures, M W 9. Laboratory to be arranged. *Mineralogy Laboratory, McGraw.*

313. **Mineralogy.** Second term. Credit three hours; if taken after 311, credit two hours. Prerequisite, course 312 and Chemistry 101. Dr. BURFOOT. Lectures, M W 9. Laboratory to be arranged. *Mineralogy Laboratory, McGraw.*

[315. **General Lithology.** Second term. Credit one hour. Prerequisite, Geology A or 100, and 311. Dr. MAYO. Lectures, laboratory, and recitations. Not given in 1933-34.]

316. **Metamorphic Geology.** First term. Credit two hours. For advanced students. Registration by permission only. Dr. BURFOOT. T Th 9. The processes and criteria of rock metamorphism.

317. **Optical Mineralogy.** First term. Credit three hours. Prerequisite, Geology 311 or 313. Dr. MAYO. Lectures, M W 8. Laboratory to be arranged. *Mineralogy Laboratory, McGraw.*

A brief study of principles, with emphasis on determination of minerals in sections and grains.

318b. **Advanced Petrography.** First term. Credit three hours. Prerequisite, Geology 318a. Dr. MAYO. Lectures, M W 9. Laboratory to be arranged. Advanced principles and methods.

319. **Sedimentary Petrography.** Second term. Credit three hours. Prerequisite, Geology 317. Dr. MAYO. Lectures, M W 9. Laboratory to be arranged.

The study of sedimentary rocks in grains, and principles of correlation.

## PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

400. **Historic Geology.** Repeated in the second term. Credit three hours. Prerequisite, Geology A, or 100 by special permission. Dr. CASTER. Lectures, T Th 10. Laboratory, M 1:40 or S 8. *McGraw.*

A review of the geologic history of the earth and its inhabitants, with special emphasis on American geology. Field trips in laboratory periods, when weather permits.

\*401. **Ancient Life.** First term. Credit two hours. A cultural résumé of the knowledge of organic development during former periods of the Earth's history. Professor HARRIS. Lectures, T Th 11. *McGraw.*

This course is primarily designed for the general student of Humanities who desires some fundamental, but not too technical information on the evolution and distribution of life on the Earth.

402. **Stratigraphic Paleontology.** Throughout the year. Credit three hours a term. Prerequisite, Geology 400 and a course in Paleontology or the permission of the instructor. Professor HARRIS and Dr. CASTER. Lectures, T Th 8. Laboratory, by appointment. *McGraw 28.*

A careful study of characteristic fossils of geologic formations. First term: characteristic fossils of the Paleozoic. Second term: characteristic fossils of the Mesozoic and Tertiary.

403. **Introductory Paleontology.** First term. Credit three hours. Prerequisite, Geology 400. Dr. CASTER. Lectures, M W 10. Laboratory, F 1:40. *McGraw 28.*  
An introduction to the study of fossils.

404. **Invertebrate Paleontology.** Throughout the year. Credit three hours a term. Prerequisite, Introductory Paleontology or the permission of the instructor. Professor HARRIS. Lectures, M W 8. Laboratory by appointment. *McGraw 28.*

405. **Invertebrate Paleontology: Foraminifera.** Throughout the year. Credit three hours a term. Professor HARRIS. A course in invertebrate zoology is desirable as preparation. First term: lecture, M 11, two laboratories by appointment. Second term: three laboratories by appointment. May be begun either term. Not open to freshmen. *McGraw 28.*

406. **Paleontologic and Stratigraphic Problems.** Throughout the year. May be begun either term. Credit variable. Prerequisite, permission of the instructor. Professor HARRIS and Dr. CASTER. Conference by arrangement. *McGraw 28.*

407. **Paleontology and Stratigraphy of South America.** First term. Credit two hours. Prerequisite, Geology 400, or the equivalent, and a course in Paleontology. Reading in French, German, and Spanish. Professor HARRIS. Two lectures a week by arrangement. *McGraw 28.*

408. **Geologic History of New York State.** Second term. Credit three hours. Prerequisite, Geology 400, and the permission of the instructor. Dr. CASTER. Lecture, T 4, laboratory, W 1:40; second laboratory by appointment.

An informal course involving careful study of the literature coupled with field work in New York State. One week-end field trip and several all-day trips.

#### ECONOMIC GEOLOGY

500. **General Economic Geology.** Throughout the year. Credit three hours a term. Prerequisite, first term, Geology A; second term, A and 311. Professor RIES and Mr. JONES. Lectures, M W 10. Laboratory, F 1:40. *McGraw.*

The origin, nature, distribution, uses and economic value of mineral products. First term, non-metallies, including coal, oil, gas, fertilizers, etc.; second term, the ore deposits of the different metals.

\*501. **Engineering Geology.** Repeated in second term. Credit four hours. For engineering students. Others only by permission. Professor RIES and Mr. JONES. Lectures, M W 11. Two laboratory periods, M W or T Th 1:40. *McGraw.* Not the equivalent of Geology A or 100.

A discussion of the practical application of geologic principles to engineering work, and of the occurrence of such economic materials as are of importance to engineering students.

502. **Petroleum Geology.** Second term. Credit three hours. Prerequisite, Geology A or equivalent. Assistant Professor NEVIN. Lectures, T Th 11. Laboratory, Th 1:40. *McGraw.*

A course on the geology and distribution of petroleum. Geology 503 should, if possible, be taken first.

503. **Petroleum Technology.** First term. Credit two hours. Prerequisite, Geology A or equivalent. Assistant Professor NEVIN. Lectures, M W 11. *McGraw.*

The geological factors affecting the location of wells, production technology, and valuation problems.

#### GERMAN

*For a major in German the following courses must be completed: (1) in German, courses 1-5 or their equivalent, and at least twenty-one hours of advanced courses, including 15 and at least one course each in Lessing, Goethe, and Schiller; (2) in related subjects, at least fifteen hours selected from Bibliology, the Classics (Archaeology, Greek, Latin), Comparative Study of Literature, English, History, Philosophy, Romance Languages, Scandinavian Languages and Literatures.*

\*1. **Course for Beginners: Oral Training, Grammar, Composition, Translation.** Repeated in second term. Credit six hours.

## First term:

Sec. 1, daily 8. *Goldwin Smith* 183. Dr. HIEBLE.

Sec. 2, daily 9. *Goldwin Smith* 183. Dr. KUBLER.

Sec. 3, daily 10. *Goldwin Smith* 183. Professor POPE.

## Second term:

Sec. 1, daily 8. *Goldwin Smith* 183. Dr. WOOD.

Sec. 2, daily 9. *Goldwin Smith* 183. Mr. LOUIS.

This course is equivalent to first and second year German of the entrance requirements (credit two units). It may be elected for three hours' credit by students who have entrance credit for only one unit of German (first year German).

**\*1a. Course for Beginners: Oral Training, Grammar, Composition, Translation.** Throughout the year. Credit six hours on completion of the course.

Sec. 1, M W F 8. *Goldwin Smith* 177. Mr. SCHAUMANN.

Sec. 2, M W F 9. *Goldwin Smith* 177. Dr. WOOD.

Sec. 3, T Th S 9. *Goldwin Smith* 177. Dr. WOOD.

Sec. 4, M W F 10. *White* 6. Dr. HIEBLE.

Sec. 5, T Th S 10. *Goldwin Smith* 177. Dr. HIEBLE.

Sec. 6, M W F 11. *Goldwin Smith* 183. Professor BOESCHE.

Sec. 7, T Th S 11. *Goldwin Smith* 183. Dr. KUBLER.

Sec. 8, M W F 12. *Goldwin Smith* 190. Mr. LOUIS.

This course is continuous throughout the year, and no credit is allowed for the first term alone. It is equivalent to first and second year German of the entrance requirements (credit two units). It may be elected in the second term by students who have had first year German (one unit).

**\*3. Intermediate Course. Oral Training, Grammar, Composition, Translation.** Repeated in second term. Credit five hours. Prerequisite, German 1, 1a, or entrance credit for two units of German (first and second year German).

## First term:

Sec. 1, M T W Th F 10. *Goldwin Smith* 190. Mr. LOUIS.

Sec. 2, M T W Th F 12. *Goldwin Smith* 177. Dr. WOOD.

## Second term:

M T W Th F 10. *Goldwin Smith* 183. Mr. SCHAUMANN.

This course is equivalent to third year German of the entrance requirements.

**\*3a. Intermediate Course. Oral Training, Grammar, Composition, Translation.** Throughout the year. Credit three hours a term. Prerequisite, German 1, 1a, or entrance credit for two units of German (first and second year German).

Sec. 1, M W F 11. *Goldwin Smith* 177. Professor FAUST.

Sec. 2, T Th S 12. *Goldwin Smith* 183. Dr. KUBLER.

This course is equivalent to third year German of the entrance requirements.

**\*4. Elementary German Composition and Conversation.** Throughout the year. Credit three hours a term. Open to those who are taking or have taken German 3.

Sec. 1, M W F 9. (First term only). *White* 5. Dr. HIEBLE.

Sec. 2, M W F 11. Dr. KUBLER. *Goldwin Smith* 190.

Sec. 3, M W F 12. *Goldwin Smith* 183. First term, Mr. SCHAUMANN; second term, Professor POPE.

Exercises conducted in German. Course 4 may be combined with courses 3 or 5.

**\*5. Rapid Reading Course.** Throughout the year. Credit three hours a term. Prerequisite, German 3, or its equivalent. First term. Dr. WOOD; second term, Professor POPE. T Th S 11. *Goldwin Smith* 190.

Reading of modern German texts; oral exercises in German on the text; German grammar treated topically.

**\*7. Reading and Composition.** Second term. Credit six hours. Prerequisite, course 3, 3a, or the equivalent. Daily 12. *Goldwin Smith* 177. Dr. HIEBLE.

This course covers in part the work of courses 4 and 5. It is designed to succeed course 3 (first term).

\*8. **Scientific German.** Second term. Credit three hours. Prerequisite, German 1-3, or three years of German in high school. Dr. KUBLER. M W F 10. *Goldwin Smith* 190.

10. **Advanced German Composition and Conversation.** Throughout the year. Credit three hours a term. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. M W F 10. *Goldwin Smith* 177.

Exercises conducted in German. Theme-writing. This course is essential for the pursuit of advanced work in the department and must be completed by students who desire to be recommended as teachers of German.

[11. **Schiller's Dramas.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor ANDREWS. Not given in 1933-34.]

12. **Schiller's Poems.** Second term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. M W F 12. *Goldwin Smith* 188.

13. **Goethe's Life and Works.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. T Th S 9. *Goldwin Smith* 190.

14. **Goethe's Faust**, part I and selected portions of part II. Second term. Credit three hours. Not open to freshmen. Prerequisite, German 1-5, or the equivalent. Professor FAUST. T Th S 9. *Goldwin Smith* 190.

15. **Survey of German Literature.** Lectures in English, collateral reading in German. Throughout the year. Credit three hours a term. Prerequisite, German 1-4, or the equivalent. Professor FAUST. M W F 9. *Goldwin Smith* 190.

16. **Contemporary German Literature.** Throughout the year. Credit three hours a term. Prerequisite, German 1-5, or the equivalent. Professor FAUST. M W F 10. *Goldwin Smith* 181.

A study of the literature of modern Germany, including foreign influences. Lectures in German, recitations, and collateral reading.

[17. **Nineteenth Century Drama.** Kleist, Grillparzer, Hebbel, Hauptmann. First term. Prerequisite, German 1-4, or the equivalent. Professor POPE. Not given in 1933-34.]

18. **Lessing's Life and Works.** First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor POPE. T Th S 11. *Goldwin Smith* 177.

[19. **Heine's Life and Works.** Second term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor BOESCHE. Not given in 1933-34.]

20. **Introduction to German Folklore.** Second term. Systematic treatment of the fairy tales, proverbs, folk-songs, and popular ballads of Germany. Collateral readings. Lectures in German. Credit three hours. Prerequisite, German 1-4, or the equivalent. Dr. HIEBLE. M W F 11. *Goldwin Smith* 178.

21. **Deutsche Kulturkunde.** Second term. Lectures in German and collateral reading. Credit three hours. Prerequisite, German 1-4, or the equivalent. Dr. KUBLER. T Th S 10. *Goldwin Smith* 190.

The lectures will give a survey, with illustrations, of the life, customs, and civilization of Germany, present and past.

[25. **Wagner's Life and Works.** Second term. Credit three hours. Prerequisite, German 1-5; otherwise only by special permission. Professor POPE. Not given in 1933-34.]

Lectures on Wagner's theory of the music drama, the sources of his operas, his place in German literature, and his influence on modern culture. The texts of the principal operas will be read in class, and bi-weekly illustrative recitals will be given throughout the term, in conjunction with the Department of Music.

[30. **Der deutsche Einschlag in der Bevölkerung der Vereinigten Staaten.** Geschichtliche Entwicklung und Bedeutung im Aufbau des amerikanischen Volkes. Kulturelle und literarische Beziehungen. First term. Credit three hours. Prerequisite, German 1-5, or the equivalent. Professor FAUST. Not given in 1933-34.]

Lectures in German, collateral reading in German. Alternating with course 16 in successive years.



37. **Middle High German.** Throughout the year. Credit three hours a term. Prerequisite, German 1-5, 10, and six hours of literature. Professor POPE. T Th S 12. *Goldwin Smith* 190.

[40. **Teachers' Course in Methods.** First term. Credit two hours. Prerequisite, German 1-5, 10, and twelve hours of advanced work in German literature or philology. Professor FAUST. Not given in 1933-34.]

42. **Gothic.** First term. Credit three hours. Professor BOESCHE. M W F 12. *Goldwin Smith* 188.

43. **Old High German.** Second term. Credit three hours. Prerequisite, German 37. Professor BOESCHE. T Th S 12. *Goldwin Smith* 188.

[47. **Germanic Antiquities.** Second term. Credit one hour. Primarily for graduates. Professor ANDREWS. Not given in 1933-34.]

A consideration of the sources of knowledge of the Germanic people up to and including the migrations.

[48. **Principles of Germanic Philology.** Second term. Credit two hours. Prerequisite, German 42. Professor ANDREWS. Not given in 1933-34.]

49. **Seminary in German Literature.** First term. Credit two hours. Primarily for graduates. Professor FAUST. Th 3-5. *Goldwin Smith* 181.

50. **Seminary in German Literature.** Second term. Credit two hours. Professor POPE. Th 3-5. *Goldwin Smith* 181.

52. **Seminary in German Philology.** Second term. Credit two hours. Professor BOESCHE. Topics in Historical German Syntax. F 3-5. *Goldwin Smith* 188.

## GOVERNMENT

*For a major in Government, the following courses must be completed: (1) course 1, either course 8 or course 12, and at least eighteen hours of unstarred courses in the department; (2) in related subjects, at least eighteen hours to be selected from the following, of which twelve hours must be of unstarred courses and six must be in History—History 23, 32, 42, 43, 44, 65a, 86, 87, 89, 93; Economics 11, 31, 33, 36, 41, 42, 50a, 50b, 71, 72, 83a, 83b; Philosophy 5, 7, 7a.*

*Students who have a grade of 85 or better in one-half the hours they have passed may take informal study in Government.*

*Candidates for honors in Government will be required to take three hours of informal study during each semester of the senior year. They will also be required to pass a comprehensive examination.*

*Students registered in the combined Arts-Law course with a major in Government will be required to complete a minimum of ten hours of upperclass courses in Government and eight hours from the list of courses in related fields printed above.*

\*1. **American Government.** Throughout the year. Credit three hours a term. First term is prerequisite to second. Open to sophomores, juniors, and seniors, and to a limited number of freshmen, particularly those planning to study law. Professor CUSHMAN and Mr. TRIMBLE. Lectures, T Th 9. Quiz hours to be arranged. *Goldwin Smith* A.

A major part of the year will be spent in studying the American national government, its historical development, organization, powers, and practical working. Attention will be given to the structure, functions, and methods of political parties. During part of the second term some of the more important problems of American state government will be dealt with.

\*2. **Comparative Government.** First term. Credit three hours. Open to sophomores. Mr. TRIMBLE. M W F 10. *Boardman*.

Government and politics of England and Continental Europe, particularly France, Germany and Switzerland; tendencies in the new Europe; federal government.

\*8. **History of Political Thought.** Second term. Credit three hours. Open to sophomores. Professor CATLIN. M W F 10. *Boardman* A.

An introductory course in political theory.

9. **Introduction to International Relations.** First term. Credit three hours. Open to sophomores. Assistant Professor BRIGGS. M W F 9. *Boardman A.*

A survey of nationalism, internationalism, imperialism, and the racial, political economic, and geographical factors in modern international relations.

10. **Political Philosophy and Science.** Second term. Credit three hours. Open to qualified upperclassmen. Consult the instructor before registering. Professor CATLIN. M W 2 and other hour to be arranged. *Boardman A.*

Discussion of contemporary political theory; the theory of authority, sovereignty, and liberty; toleration and censorship; aristocracy and representative government.

11. **Political Institutions.** Second term. Credit three hours. Professor CATLIN. M W F 11. *Boardman A.*

A study of the development and structure of certain political institutions, and of their function in modern society.

12. **History of Political Theory.** (See Philosophy 10). Professor SABINE.

14. **International Law.** Throughout the year. Credit three hours a term. Completion of first term is prerequisite to second. Open to qualified upperclassmen. Assistant Professor BRIGGS. M W F 12. *Boardman A.*

A systematic study of the nature, development, and judicial application of the principles of international law. Cases, readings, discussions.

15. **International Organization.** Second term. Credit three hours. Open to upperclassmen, and to sophomores who have completed Government 9. Assistant Professor BRIGGS. M W F 9. *Boardman A.*

The development of international administration, international legislation, collective political intervention; the origin, organization, and working of the League of Nations; the Permanent Court of International Justice.

[16. **Contemporary American Foreign Policy.** Second term. Credit three hours. Open to upperclassmen, and to sophomores who have completed Government 9. Assistant Professor BRIGGS. M W F 9. *Boardman.* Not given in 1933-34.]

The foreign relations of the United States during the 20th century; our Caribbean policy; the limitation of armaments; post-war relations with Europe, the Far East.

20. **Constitutional Law: The American Federal System.** First term. Credit three hours. Open to upperclassmen. Prerequisite, both terms of Government 1 or the consent of the instructor. Professor CUSHMAN. T Th S, 11. *Boardman.*

Judicial interpretation of the constitution: the nature of judicial review; separation of governmental powers; relations between state and national government; construction of national powers.

Government 20 and 21 are not designed primarily for pre-law students, but for those having a major interest in government, history, and economics. Attention is called to the fact that the Law School requires for graduation the regular Law School course in constitutional law.

21. **Constitutional Law: Fundamental Rights and Immunities.** Second term. Credit three hours. Open to upperclassmen. Prerequisite, Government 20 or the consent of the instructor. Professor CUSHMAN. T Th S 11.

Privileges and immunities of citizenship; protection of civil and political rights; the obligation of contracts; due process of law and the equal protection of the law. Not designed primarily for pre-law students, but for those having a major interest in government, history, and economics. The Law School requires its students to complete the Law course in Constitutional Law before graduation.

22. **Seminary in Constitutional Problems.** First term. Credit two hours. Open to graduate students and qualified seniors. Professor CUSHMAN. Hours to be arranged.

23. **Seminary in Politics.** Second term. Credit two hours a term. Open to graduate students and qualified seniors. Professor CATLIN. Day and hour to be arranged.

24. **Seminary in International Law and International Organization.** Throughout the year. Credit two hours a term. Open to graduate students and qualified seniors. Assistant Professor BRIGGS. Hours to be arranged.

25. **Social, Legal, and Political Ethics.** (See Philosophy 7a.) Professor THILLY.

26. **Trade Unionism and Labor Law.** (See Economics 42.) Assistant Professor MONTGOMERY.

## HISTORY

*For a major in History, the following courses must be completed: (1) in History, at least twenty-four hours in unstarred courses; (2) in related subjects, at least fifteen hours of which at least six shall be selected from the following—Economics 83a, 83b, Philosophy 5, Philosophy 10, with the remainder of the fifteen to be selected from any unstarred courses in Economics, Philosophy, and Government B.*

\*1. **Outlines of Ancient History.** (The Near Eastern Countries, Greece and Rome to A.D. 337.) Throughout the year. Credit six hours on completion of the course. Professor LAISTNER. M W F 9. *Boardman B.*

Textbook, lectures, and collateral reading.

3. **Greek History, 500 to 323 B. C.** Second term. Credit three hours. Prerequisite, History 1 or the equivalent. Professor LAISTNER. M W F 11. *Boardman E.*

[4. **The Roman Empire, 30 B. C. to 180 A. D.** Second term. Credit three hours. Prerequisite, History 1 or 5. Professor LAISTNER. M W F 11. *Boardman.* Not given in 1933-34.]

[5. **The Roman Republic, 133 to 30 B. C.** First term. Credit three hours. Prerequisite, History 1 or a satisfactory equivalent. Professor LAISTNER. M W F 11. *Boardman.* Not given in 1933-34.]

7. **The History of Education.** (Greek, Roman, and Early Medieval.) First term. Credit two hours. For upperclassmen and graduates only. Professor LAISTNER. T Th 10. *Boardman E.* See Education 3.

NOTE. Courses 3, 4, 5, 7 though primarily for undergraduates are also open to graduate students.

\*21. **Mediaeval History.** Throughout the year. Credit six hours on completion of the course. Professor STEPHENSON. M W F 10. *Goldwin Smith A.*

A general survey of Europe from the 4th to the 15th century. Lectures, text, map work, outside reading, individual conferences.

23. **Mediaeval Thought.** Second term. Credit two hours. Prerequisite: History 21 or equivalent. Professor STEPHENSON. T Th 10. *Boardman D.*

Discussions, lectures, and illustrative reading on the intellectual development of Europe from the 11th to the 14th century.

32. **The Age of the Renaissance and Reformation.** Second term. Credit three hours. Professor SMITH. M W F 10. *Boardman C.*

[34. **Historical Method.** Second term. Credit two hours. Prerequisite, a reading knowledge of either French or German. Professor SMITH. Not given in 1933-34.]

35. **Church History.** Second term. Credit two hours. Open to graduates and qualified seniors. Prerequisite, a reading knowledge of Latin. Professor SMITH. S 10. *Boardman 2.*

36. **History of Education (Late Medieval and Modern).** Second term. Credit two hours. Professor SMITH. T Th 10. *Boardman B.*

This is a continuation of History 7, but either term may be taken separately. It is a survey of educational theory and practice from the tenth to the nineteenth century. See Education 3.

\*42. **History of Modern Europe.** Throughout the year. Credit three hours a term. Not open to freshmen. Professor BECKER. M W F 3. *Goldwin Smith C.*

A survey of European history from the beginning of the 17th century to 1914. Political, economic, and intellectual movements emphasized in proportion to their international or European importance.

[43. **French Revolution.** First term. Credit two hours. Prerequisite, first term of History 42, or the special permission of the instructor. Professor BECKER. T Th 3. *Boardman*. Not given in 1933-34.]

44. **Napoleonic Era.** First term. Credit two hours. Prerequisite, first term of History 42, or the equivalent. Professor BECKER. T Th 3. *Boardman* B. A study of the rise and fall of the Napoleonic Empire, 1795-1815.

\*61. **English History.** Throughout the year. Credit six hours on completion of the course. Professor MARCHAM. T Th S 11. *Boardman* A.

A survey of English history from the Anglo-Saxon invasions to the present.

65a. **History of the English Constitution to 1485.** First term. Credit two hours. Professor STEPHENSON. T Th 10. *Boardman* C. Not open to freshmen.

A study of English institutions, emphasizing the formative period after the Norman Conquest and including a sketch of legal development.

65b. **History of the English Constitution, 1485 to the Present.** Second term. Credit two hours. Professor MARCHAM. T Th 2. *Boardman* C. Not open to freshmen. A historical survey of the chief legislative, judicial, and administrative institutions.

66a. **History of England under the Tudors.** First term. Credit three hours. Professor MARCHAM. T Th S 9. *Boardman* C. Not open to freshmen. A lecture course with readings in the literature of the period.

66b. **History of England under the Stuarts.** Second term. Credit three hours. Professor MARCHAM. T Th S 9. *Boardman* C. Not open to freshmen. A continuation of History 66a.

[67. **History of England in the 18th Century.** First term. Credit three hours. Professor MARCHAM. T Th S 9. *Boardman* C. Not open to freshmen. A lecture course with readings in the literature of the time. Not given in 1933-34.]

[68. **History of England in the 19th and 20th Centuries.** Second term. Credit three hours. Professor MARCHAM. T Th S 9. *Boardman* C. Not open to freshmen. A continuation of History 67. Not given in 1933-34.]

\*82. **American History, 1783-1850.** First term. Credit three hours. Open to sophomores, juniors, seniors. Professor WHITAKER. M W F 9. *Boardman* C. Apply at *Goldwin Smith* 236 on registration day for seat assignment.

Formation of new national government; European complications; domestic problems; rise of sectional parties. Textbook, lectures, and readings.

\*83. **American History, 1850-1914.** Second term. Credit three hours. Professor WHITAKER. Prerequisite, History 82. M W F 9. *Boardman* C.

Open to sophomores, juniors, seniors. Secession and civil war, reconstruction, recent political and constitutional history. Textbook, lectures, and readings.

\*86. **American History, 1787-1848.** Second term. Credit three hours. Sophomores, juniors, and seniors. Professor BRETZ. M W F 9. *Boardman* E. Apply at *Boardman* 9 on registration day for seat assignment. Not open to students who have had History 82.

\*[87. **American History since 1848.** Second term. Credit three hours. Sophomores, juniors, and seniors. Professor BRETZ. M W F 9. *Boardman*. Will not be given in 1933-34.]

89. **American History, 1750-1848.** The Settlement of the Middle West. Second term. Credit two hours. Prerequisite, History 82 or 86 or the equivalent. Upperclassmen only. Professor BRETZ. T Th 9. *Boardman* E. Apply at *Boardman* 9 on registration day for seat assignment.

93. **Spanish America, 1492-1808.** Throughout the year. Credit two hours a term. Prerequisite, History 82, 83, or the equivalent. Upperclassmen only. Professor WHITAKER. T Th 11. *Boardman* E.

96. **American History.** Investigation of topics in a selected field. Second term. Credit two hours. For upperclassmen with majors in history. Professor BRETZ. M 2-4, or an hour to be arranged. *Boardman.* Consult the instructor before registering.

# MATHEMATICS

*For a major in Mathematics, the following courses must be completed: (1) in Mathematics, at least fifteen hours of unstarred courses; (2) in related subjects, at least fifteen hours to be selected from the following list—Astronomy, any courses; Chemistry 405; Economics 21a, 21b; Education 1 2, 3, 4, 4a, 5, 7, 13; French 1, 3, 3a, 4a, 4b, 5a, 5b, 6; Geology 312; German 1, 1a, 3, 3a, 4, 5, 7, 8; Italian 1; Philosophy 1, 2, 2a, 3, 5, 15; Physics, any courses.*

*Examinations for the removal of conditions in courses 1 to 8 are held in September just before registration. For further information regarding the time and place of these examinations, students should apply at White 20. No student may take more than one examination the same September.*

*Students wishing to take any of the courses numbered above 15 are invited to confer with the teachers concerning these courses.*

*Of courses 1-8, not more than six (6) hours may be taken simultaneously without the special permission of the department.*

\*1. **Solid Geometry.** Repeated in second term. Credit three hours except for students offering Solid Geometry for entrance. First term, T Th S 10, M W F 8. Second term, M W F 10, T Th S 8.

\*2. **College Algebra.** Repeated in second term. Credit three hours. M W F 9, T Th S 9.

\*3. **Plane Trigonometry.** Repeated in second term. Credit three hours except for students offering Trigonometry for entrance. First term, M W F 10, T Th S 8. Second term, T Th S 10, M W F 8.

4a, 4b. **Analytic Geometry and Calculus.** Primarily for students in the College of Arts and Sciences. Prerequisites, Mathematics 1, 2, 3, or the equivalent.

\*4a. Daily except S, 11. Credit five hours. Repeated in second term.

\*4b. Daily except S, 11. Credit five hours. Continuation of 4a. Repeated in second term.

5a, 5b. **Analytic Geometry and Calculus.** Primarily for students in the College of Engineering and for candidates for the degree of B.Chem. Prerequisites, Mathematics 1 and 3, or the equivalent.

\*5a. Daily except S. Credit five hours. Repeated in second term.

\*5b. Daily except S. Credit five hours. Continuation of course 5a. Repeated in second term.

\*8. **Analytic Geometry and Calculus.** Primarily for students in the College of Architecture. Throughout the year. Credit three hours a term. Prerequisites, Mathematics 1, 2, 3, or the equivalent.

\*15. **Elementary Course in Higher Mathematics.** Throughout the year. Credit three hours a term. Prerequisites, Mathematics 1, 2, 3, or the equivalent. Professor HURWITZ. M W F 9. *White 6.*

Students who have had the equivalent of any part of Mathematics 4a, 4b may receive only partial credit for the second term.

Intended for students who do not plan to take many courses in mathematics, but who wish to become acquainted with the principal ideas of the field. The object will be to make clear the fundamental aims, methods, and results of a number of subjects, rather than to develop the technique of any one. The course will deal with the theory of numbers, vector analysis, groups; synthetic geometry, including some topics in projective, non-euclidean, and higher dimensional geometry; analytic geometry, calculus, famous problems of mathematics. Lectures, assigned reading, and exercises.

[20. **Teacher's Course.** Second term. Credit three hours. Prerequisite or parallel course, Mathematics 5b.

A review of the methods of proof of important topics in algebra and geometry; an attempt to give perspective to elementary mathematics by showing the co-ordination between the parts. Not given in 1933-34; to be given in 1934-35.]

21. **Theory of Numbers.** First term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Assistant Professor JONES. T Th S 8. *White 2.*

Linear and quadratic congruences, primitive roots, a brief introduction to the theory of quadratic forms and continued fractions.

23. **Modern Algebra.** First term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Professor CARVER. M W F 10. *White 10.*

Determinants, matrices, linear dependence, linear transformations.

24. **Theory of Equations.** Second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Assistant Professor JONES. T Th S 8. *White 2.*

DeMoivre's theorem, cubic and quartic equations, Newton's method, determinants and eliminants, symmetric functions.

26. **Theory of Finite Groups.** Second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Professor CARVER. M W F 10. *White 10.*

An elementary course dealing with groups of motions, permutations, and transformations; and treating such abstract group topics as simple and multiple isomorphism, Sylow's theorem, Abelian and prime-power groups.

41. **Elementary Differential Equations.** Repeated in second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Dr. CAMERON. T Th S 11. *White 27.*

42. **Advanced Calculus.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Professor GILLESPIE. M W F 11. *White 1.*

A study of the processes of the calculus, their meanings and applications. It is designed to furnish a necessary preparation for advanced work in analysis and applied mathematics.

45. **Theory of Functions of a Complex Variable.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Professor HURWITZ. T Th S 9. *White 6.*

An elementary course in the theory of analytic functions of a complex variable.

46. **Elliptic Integrals.** First term. Credit one hour. Prerequisite, Mathematics 4b or the equivalent. Professor HUTCHINSON. S 10. *White 25.*

The reduction of elliptic integrals to normal forms and their numerical evaluation, with simple applications to geometry and mechanics.

47. **Integral Equations.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 42 or its equivalent. Assistant Professor AGNEW. M W F 11. *White 6.*

Differential equations with boundary conditions, linear transformations, orthogonal developments, and related topics.

50. **Entire Functions.** Second term. Credit one hour. Prerequisite, Mathematics 4b or the equivalent. Professor HUTCHINSON. S 10. *White 25.*

A brief outline of the general theory with proofs and illustrations of the most fundamental theorems.

61. **Projective Geometry.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Dr. BLACK. M W F 9. *White B 2.*

The elements of projective geometry treated synthetically.

62. **Advanced Analytic Geometry.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4b or the equivalent. Professor RANUM. T Th S 10. *White 9.*

Projective geometry of one, two, and three dimensions treated by means of homogeneous coordinates.

64. **Cremona Transformations.** First term. Credit three hours. Prerequisite, Mathematics 61. Professor SNYDER. M W F 8. *White 24.*

The theory on plane Cremona transformations with applications to cubic and quartic curves.

65. **Algebraic Curves.** Second term. Credit three hours. Prerequisites, Mathematics 61, 62, 64. Professor SNYDER. M W F 8. *White 24.*

The geometry on an algebraic curve, canonical series, the Riemann-Roch theorem, birational transformations.

85. **Vector Analysis.** First term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Professor SHARPE. M W F 9. *White 28.*

The algebra and calculus of vectors with applications to mechanics and electrical theory.

87. **Operational Calculus.** Second term. Credit three hours. Prerequisite, Mathematics 4b or the equivalent. Professor SHARPE. M W F 9. *White 28.*

The mathematical foundation of the Heaviside calculus with applications.

100. **Problems, Research, and Informal Study.** For properly qualified students, members of the department will direct reading and research not necessarily associated with any course.

The following courses are offered frequently but not every year: Theory of Functions of a Real Variable, Calculus of Variations, Infinite series, Differential Geometry, Geometry of Hyperspace, Non-Euclidean Geometry, Principles of Mechanics, Differential Equations of Mathematical Physics, Hydro-dynamics, Elasticity, Probability and Statistics.

## MUSIC

*For a major in Music, the following courses must be completed: (1) in Music, twenty to twenty-four hours of advanced courses which students interested in critical and historical work may satisfy by a sequence selected from courses 5, 10, 12, 13, 22, 23, 60, 61 and 100, and which students interested in theoretical work may satisfy by a sequence selected from courses 10, 22, 23, 24, 25, 31, 40, 41, 60 and 61; (2) in related courses, at least fifteen hours to be selected from courses in Archaeology, Comparative Study of Literature, Education, English, French, German, History, Philosophy, Physics, Psychology, Public Speaking, and Fine Arts. Students who plan to major in Music should consult Professor Weaver at the beginning of their freshman year, or as soon thereafter as possible.*

*The University offers opportunities for choral training to students who have the ability to sing, through the Sage Chapel Choir, which rehearses in the choir loft of Sage Chapel on Sundays at 10 and on Monday evenings from 7:30 to 9, and which sings at the regular Sunday morning services and at especially scheduled vesper services. Applications for admission to the choir should be made to Professor Weaver, at the office of the Music Department, 320 Wait Avenue, September 25-27, 9 a.m.-12 m.*

*The University offers opportunities for instrumental ensemble work to students who play band and orchestral instruments, through the University Orchestra and the University Bands, which are trained and conducted by Mr. George L. Coleman. The University Orchestra rehearses in Sibley Dome on Monday evenings from 7:30 to 9:00 and on Thursday afternoons from 4:30 to 5:30. The University Bands rehearse in the Drill Hall on Monday, Wednesday, and Friday afternoons from 4:30 to 5:30. Applications for admission to the Orchestra and Bands should be made to Mr. Coleman, at the Drill Hall, Monday-Wednesday, September 25-27, 10 a.m.-4 p.m.*

*The University offers opportunities for chamber ensemble work in string quartets and other chamber music groups. Students who are interested should consult Professor Ross at his office at 320 Wait Avenue at the beginning of the term.*

\*1. **Theory and Practice of Music.** One term only; given each term. Credit two hours. Primarily for underclassmen, but open to all students who have had little or no training in music. Students offering music for entrance credit may not take this course for credit. Assistant Professor HAIGH. T 2-4, Th 2-3:30. 320 Wait Avenue.

An elementary course in the theory of music, including notation and terminology, scale, interval and chord structure, melody writing, ear training, sight-reading, and the elements of musical design. This course or its equivalent is prerequisite to all courses in music theory and is recommended as a background for all other courses.

5. **The Art of Music.** Throughout the year. Credit three hours a term. Professor WEAVER. M W F 11. 320 *Wait Avenue*. Open to sophomores and upperclassmen.

An approach to the rational understanding and enjoyment of the art of music.

10. **History of Music.** Throughout the year. Credit two hours a term. Open to upperclassmen and graduates, and to underclassmen by permission. Professor WEAVER. T Th 10. 320 *Wait Avenue*.

A survey of the evolution of the art of music, with particular reference to questions of style and to the place of music in the artistic and social life of nations. First term, the music of primitive peoples, of early civilizations, of the middle ages, and up to approximately the year 1700. Second term, from approximately 1700 to the present day.

12. **Historical Survey of Piano Music.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates, and to underclassmen by permission. Assistant Professor HAIGH. M W F 10. 320 *Wait Avenue*.

An illustrated course giving a survey of piano music from its beginnings to the present time. First term, through the classic period; second term, the romantic and modern periods.

13. **Historical Survey of Orchestral Music.** Throughout the year. Credit three hours a term. Open to upperclassmen and graduates, and to underclassmen by permission. Assistant Professor ROSS. M W F 2. 320 *Wait Avenue*.

An illustrated course giving a survey of orchestral literature from its beginnings to the present time. First term, through the work of Beethoven; second term, from Beethoven to the present time.

\*20. **Harmony.** Throughout the year. Credit three hours a term. Prerequisite, Music 1 or its equivalent. Assistant Professor SMITH. M W F 9. 320 *Wait Avenue*.

The construction and interconnection of triads and their inversions; chords of the seventh and their inversions; chords of the ninth, chromatic harmony, suspensions and ornamental tones; harmonizing both bass and soprano melodies.

22. **Harmonic Analysis.** First term. Credit three hours. Prerequisite, Music 20. Assistant Professor SMITH. M W F 10. 320 *Wait Avenue*.

Analysis of the harmonic structure of selected compositions of various composers.

23. **Musical Form.** Second term. Credit three hours. Prerequisite, Music 20. Assistant Professor SMITH. M W F 10. 320 *Wait Avenue*.

A study of the typical musical forms as illustrated by selected compositions of various composers.

24. **Counterpoint.** Throughout the year. Credit two hours a term. Prerequisite, Music 20 or its equivalent. Assistant Professor SMITH. T Th 9. 320 *Wait Avenue*.

A course dealing with the principles of melodic combination.

25. **Double Counterpoint, Canon and Fugue.** Throughout the year. Credit three hours a term. Prerequisites, Music 20 and 24. Assistant Professor SMITH. M W F 8. 320 *Wait Avenue*.

A course in advanced counterpoint, leading to fugal writing in the second term.

\*30. **Instrumentation.** First term only. Credit three hours. Prerequisite, Music 1 or its equivalent. Assistant Professor ROSS. M W F 8. 320 *Wait Avenue*.

A course dealing with the capacities of the instruments of the symphony orchestra. The work of the course is correlated with that of the University Orchestra, the orchestra rehearsals being applied on a laboratory basis.

31. **Elementary Orchestration.** Second term only. Credit two hours. Prerequisites, Music 20 and 30 and a fair degree of proficiency on an orchestral instrument or the piano. Assistant Professor ROSS. T Th 11. 320 *Wait Avenue*.

An elementary course dealing with the problems of practical orchestration. The work of the course is correlated with that of the University Orchestra, the orchestra rehearsals being applied on a laboratory basis.



[\*38. **Vocal Theory and Technique.** Throughout the year. Credit three hours a term. Prerequisite, Music 1 or its equivalent.

A course dealing with the theory, history, and practice of vocal production as applied to speaking and singing. The work of the course is correlated with that of the Sage Chapel choir, the choir rehearsals being applied on a laboratory basis. Not given in 1933-34.]

40. **Elementary Composition.** Throughout the year. Credit six hours on completion of the course; no credit for the first term alone. Prerequisites, Music 20 and 24. Assistant Professor HAIGH. T Th S 11. 320 *Wait Avenue*.

41. **Advanced Composition.** Throughout the year. Credit six hours on completion of the course; no credit for the first term alone. Prerequisites, Music 25 and 40. Assistant Professor HAIGH. T Th S 9. 320 *Wait Avenue*.

A continuation of course Music 40, involving original composition in the larger forms.

60. **Applied Music.** Individual instruction in organ, piano, violin. Throughout the year. Credit two hours a term, in the case of students majoring in music; for other students, no credit. Hours to be arranged. Assistant Professors HAIGH, ROSS, and SMITH. 320 *Wait Avenue*.

This course is offered primarily for students wishing to major in music; and in such cases the work of the course is definitely correlated with the theoretical courses being pursued by the student. Whenever the facilities of the department permit, other students are allowed to register for this course without credit. Permission to register for this course, whether with or without credit, should be obtained from Professor WEAVER.

Individual instruction in organ is offered under Professor SMITH, in piano under Professor HAIGH, and in violin under Professor ROSS. Practice facilities are available in each case. Students should consult the instructor at the beginning of the term as to hours for instruction, and the secretary of the department as to hours for practice.

Special fees are charged for this instruction and for the use of practice facilities; information may be obtained from the secretary of the department.

61. **Applied Music.** Individual instruction in organ, piano, violin. Throughout the year. Credit two hours a term, in the case of students majoring in music; for other students, no credit. Hours to be arranged. Assistant Professors HAIGH, ROSS, and SMITH. 320 *Wait Avenue*.

A continuation of course Music 60, open to students who have completed that course or its equivalent. The conditions and regulations applying to Music 60 also apply to this course.

100. **Seminary in Musicology.** Throughout the year. Credit two hours a term. Primarily for graduates (and by permission to seniors) who have the requisite reading knowledge of one or more of the important foreign languages, a fair knowledge of musical theory, and some skill in practical applied music. Hours to be arranged. Professor KINKELDEY.

The work is intended to make the student acquainted with the accomplishments of the past and with modern methods and aims in all fields, scientific, aesthetic, and historical, of musical research and investigation. Special topics or fields of study will be selected for each term after consultation with the class.

## PHILOSOPHY

*For a major in Ethics and Political Theory, the following courses must be completed: (1) in Philosophy, courses 5, 8, 18, and 18a, and either 7 and 7a, or 10; (2) in related subjects, six hours from each of the three following groups: (a) Economics 81 and 82, or 83a and 83b; (b) Government 14, or Government 20 and 21; (c) Psychology 10 and 12, or Economics 50a and 50b.*

*For a major in Aesthetics, the following courses must be completed: (1) in Philosophy, courses 5, 8, 18 and 18a, 4a, and 4b; (2) in related subjects, eighteen hours to be selected from one of the following groups— (a) French 16 and twelve hours from French 17, 18, 19, 20, 21; (b) Spanish 10, and twelve hours from Spanish 15, 17, 19, 20; (c)*

*German 15, and twelve hours from German 11, 12, 13, 14, 16, 17, 18, 19, 20; (d) English 44, 46, 50, 52, 54, 56, 68, 69, 70, 72; (e) Comparative Study of Literature 1, 2, 4, 5; (f) Architecture and Fine Arts 410, 411, 412, 425a, 425b, 426, 428; (g) Music, any eighteen hours after Music 1; (h) Classics, any eighteen hours.*

*For a major in Logic, the following courses must be completed: (1) in Philosophy, courses 5, 8, 18, and 18a, and either Philosophy 3 or Philosophy 15 and 17; (2) in related subjects, either Psychology 2 and 3a, 3b, or Mathematics 15 or Physics 61 and 62, and nine additional hours in either mathematics or science to be chosen in conference with the student's adviser.*

*For a major in the History of Philosophy, the following courses must be completed: (1) in Philosophy, courses 5, 8, 18 and 18a and six additional hours in the history of philosophy approved by the student's adviser; (2) in related subjects, eighteen hours selected from either of the two following groups of courses: (a) History 3, 4, 5, 7, 21, 23, 32; (b) History 32, 36, 42, 43, 61, 67, 68.*

*Candidates for honors in philosophy will be required to pass a comprehensive examination of seven and one-half hours, five hours to be devoted to the general history of philosophy and two and one-half hours to the student's special field. With the approval of his adviser, a candidate for honors may take informal study to the amount allowed by the rules of the college.*

**\*A. Elementary Study of Philosophical Classics.** Throughout the year. First term prerequisite to second term. Credit three hours a term. Open only to freshmen. Enrolment limited to sixty. Registration in *Goldwin Smith 224*.

First term:

Sec. 1, T Th S 9. *Goldwin Smith 227*. Assistant Professor CHURCH.

Sec. 2, M W F 12. *Goldwin Smith 225*. Professor SABINE.

Sec. 3, M W F 12. *Goldwin Smith 227*. Dr. PAINE.

Second term:

Sec. 1, M W F 12. *Goldwin Smith 227*. Assistant Professor ROBINSON.

Reading and discussion of some of the less difficult philosophical classics, selected from the works of Plato, Lucretius, Descartes, Berkeley, Hume, and Fichte.

**\*1. Problems of Philosophy.** First term. Credit three hours. Professor THILLY, Dr. PAINE. M W F 11. *Goldwin Smith 225*.

The fundamental problems of philosophy, together with a critical study of the most important types of philosophical theory.

**\*2. Logic.** Repeated in second term. Credit three hours. Open to freshmen in second term. Registration with the department unnecessary for the first term.

First term:

Sec. 1, M W F 11. *Goldwin Smith 227*. Professor BURTT.

Second term:

Sec. 1, T Th S 9. *Goldwin Smith 227*. Assistant Professor SMART.

Sec. 2, M W F 9. *Goldwin Smith 225*. Professor SABINE.

Sec. 3, M W F 12. *Goldwin Smith 221*. Dr. PAINE.

Sec. 4, M W F 12. *Goldwin Smith 225*. Assistant Professor ROBINSON.

The general character of the thinking process, its laws of development and the methods by which thought actually proceeds in the solution of problems.

**3. Types of Logical Theory.** Throughout the year. Credit three hours a term. Open to juniors and seniors and to sophomores by special permission. Assistant Professor SMART. M W F 9. *Goldwin Smith 227*.

In the first term main emphasis will be placed upon the fundamentals of logic in general, following the Aristotelian tradition. In the second term, an attempt will be made to evaluate the recent work of mathematical, pragmatic, and idealistic logicians.

**4a. Aesthetics.** First term. Credit three hours. Open to sophomores, juniors, and seniors. Professor OGDEN. M W F 2. *Goldwin Smith C*.

A study of the aesthetic experience as criterion of art and skill. Special consideration will be given to the underlying principles of music, the graphic and representative arts, and poetry. Designed for students interested in the fine arts as well as for those interested in the philosophical theory of values.

4b. **Aesthetics.** Second term. Credit three hours. Prerequisite, Philosophy

4a. Assistant Professor CHURCH. M W F 11. *Goldwin Smith* 227.

A study in some modern theories of expression in the arts: Santayana, Croce, Delacroix, Ducasse, and Prall.

5. **History of Philosophy.** Throughout the year. Credit three hours a term. Open to juniors and seniors, and to sophomores who have passed Philosophy A or who have twenty hours of University credit with a grade of 85 or better. Professors CUNNINGHAM and BURTT, and Assistant Professor ROBINSON. T Th 9, and an hour to be arranged. *Goldwin Smith* 142.

A survey of philosophical speculation from its origin among the Greeks to the present time; the major philosophical systems in relation to their general cultural context, and their application to social, religious, and educational problems. First term: Greek and medieval philosophy. Second term: modern philosophy to the middle of the nineteenth century; a brief sketch of contemporary tendencies. Lectures, assigned readings, discussions and reports.

\*6. **Moral Ideas and Practice.** Second term. Credit three hours. Professor THILLY. M W F 11. *Goldwin Smith* 225.

The development of moral ideas, ideals, and philosophies from early times to the present, with special emphasis on the great civilizations of the Occident.

7. **Ethics.** First term. Credit three hours. Professor THILLY. M W F 10. *Goldwin Smith* 225.

A study of the moral consciousness and of theories of right and wrong with a view to reaching a philosophy of life.

7a. **Social, Legal, and Political Ethics.** Second term. Credit three hours. Open only to juniors, seniors, and graduates. Professor THILLY. M W F 10. *Goldwin Smith* 225.

A study of the philosophical principles underlying our social, legal, and political conceptions.

8. **Plato and Aristotle.** Throughout the year. Credit three hours a term. Permission of instructor. Knowledge of the *Republic* is presupposed. First term prerequisite to second term. Assistant Professor ROBINSON. M W F 9. *Goldwin Smith* 220. Assigned readings, essays, and discussion.

[9. **The Romantic Revolution in Modern Thought,** formerly Philosophical Ideas in 19th Century Literature. First term. Credit two hours. Primarily for juniors and seniors; open to sophomores by special permission. T Th 11. *Goldwin Smith* 225. Not given in 1933-34.]

A survey of the transition in European philosophy from the point of view of the eighteenth century to that of the nineteenth with special reference to its bearing on the problem of the nature of Romanticism.

10. **History of Political Theory.** Throughout the year. Credit three hours a term. Open to juniors and seniors. Professor SABINE. T Th S 10. *Goldwin Smith* 225.

A history of the theory of civil government in relation to the principal modes of political organization that have prevailed in western European civilization from the time of the Greek city-state to the present.

[11. **Contemporary Philosophy: British and Continental.** Throughout the year. Credit two hours a term. Prerequisite, Philosophy 5. T Th 11. *Goldwin Smith* 227. Not given in 1933-34.]

A survey of the main tendencies in recent British and continental thought, with special emphasis on British idealism and the reactions against it.

[12. **American Philosophy.** Second term. Credit two hours. Prerequisite, Philosophy 5. T Th 11. *Goldwin Smith* 227. Not given in 1933-34.]

Generalized American attitudes toward life and thought as expressed in theology, politics, education, and technical philosophy, with particular emphasis on recent systems: Royce, James, Dewey, Santayana.

13. **Introduction to the Philosophy of Religion.** First term. Credit three hours. Not open to sophomores. Professor BURTT. M W F 12. *Goldwin Smith* 234.

An approach to the central problems of contemporary philosophy of religion by the study of their emergence in the great thinkers of the western world.

[14. **The Nature of Religion.** Second term. Credit three hours. Not open to sophomores. Professor BURTT. M W F 12. *Goldwin Smith* 234. Not given in 1933-34.]

A systematic consideration of the fundamental features of religious experience in comparison and contrast with scientific, philosophic, aesthetic, and practical activity.

14a. **History of Religions.** Second term. Credit three hours. Not open to sophomores. Professor BURTT. M W F 12. *Goldwin Smith* 234.

A general survey of the development of ritual, practice, and belief in religions of selected cultures.

15. **The Philosophy of the Natural Sciences.** First term. Credit three hours. Open to juniors, seniors, and graduates. Assistant Professor SMART. M W F 11. *Goldwin Smith* 248.

A study of the process of scientific reasoning, as illustrated by the historical development of important scientific conceptions, and a discussion of some of the more recent works on the philosophy of science.

[16. **French Philosophy.** First term. Credit three hours. Open to sophomores, juniors, and seniors. Assistant Professor CHURCH. M W F 11. *Goldwin Smith* 220. Not given in 1933-34.]

An introductory survey of French philosophy, designed to acquaint the student with outstanding French philosophers from Descartes to Meyerson, including Malebranche, Pascal, Arnauld, Condillac, Renouvier, and Bergson.

[17. **Philosophy and Science from Copernicus to Kant.** Second term. Credit three hours. Open to juniors, seniors, and graduates. Professor BURTT. M W F 11. *Goldwin Smith* 221. Not given in 1933-34.]

An examination of the main interactions, between 1540 and 1800, of scientific assumptions and achievements on the one hand, and philosophic problems and tendencies on the other.

18. **Introduction to Hume and Leibniz.** First term. Credit three hours. Prerequisite Philosophy 5. Assistant Professor CHURCH. M W F 10. *Goldwin Smith* 220.

A critical study of Hume's *Treatise* and of selected works of Leibniz.

18a. **Introduction to Kant.** Second term. Credit three hours. Prerequisite Philosophy 18. Assistant Professor CHURCH. M W F 10. *Goldwin Smith* 220.

An introductory survey of the philosophy of Kant. Critical reading of selections from the *Critique of Pure Reason* and from Kant's ethical writings. Some attention will be given to the *Critique of Judgment*.

[28. **The Theory of Value.** First term. Credit three hours. Assistant Professor CHURCH. Not given in 1933-34.]

A study in Naturalist, Realist, and Idealist theories of value.

## PHYSICAL EDUCATION

*The following courses are designed not only to train teachers and directors of physical education in public schools and colleges, but also to provide a general course of study which may have both a practical and a broad educational appeal. A four-year undergraduate course has been outlined to meet the requirements for the New York State Teacher's Certificate in Physical Education, copies of which may be obtained upon application.*

20. **History of Physical Education.** First term. Credit two hours. Professor YOUNG. T Th 8. *Goldwin Smith* 164.

For juniors and seniors. The distinguishing characteristics of various peoples, as to habits of living and forms of physical activity and the part these have played in their national development.

21. **Modern Developments in Physical Education.** Second term. Credit two hours. Professor YOUNG. T Th 8. *Goldwin Smith* 164.

A continuation of course 20, dealing with the history and various aspects of the physical education movement in Europe and present-day America.

22. **Theory of Physical Education and Methods of Teaching.** Second term. Credit two hours. Professor JORDAN. M W 11. *Goldwin Smith* 248.

For juniors and seniors. The objects and scope of physical education; the principles and technique involved in its teaching, arrangement, classification, and progression of exercises.

23. **Organization and Administration of Play, Athletics, and Gymnastics.** Second term. Credit three hours. Professor YOUNG and instructors. M W F 8. *Goldwin Smith* 234.

For juniors and seniors. The social and educational value of play, with special emphasis upon management and supervision of athletic sports, recreation centers, scouting activities, etc.

24. **School Hygiene.** First term. Credit two hours. Professor YOUNG. T Th 12. *Goldwin Smith* 264.

For juniors and seniors. Sanitary aspects of school environment; methods and scope of health instruction and supervision.

25. **First Aid.** Repeated in second term. Credit one hour. Dr. SHOWACRE. See Hygiene 4.

26. **Health Supervision of School Children.** Second term. Credit two hours. Dr. GOULD. See Hygiene 3.

27. **Exercise and its Physiology.** First term. Credit three hours. Assistant Professor DYE. Lectures, W F 8. Laboratory, W 1:40-4. *Stimson* 31. Prerequisite, Human Physiology 303 or its equivalent. See Animal Biology 306. Open to juniors and seniors.

An explanation of the physiologic, dynamic, and mechanical factors involved in bodily movement and in the performance of work. The human body is considered as a super-machine with variable capacities and limitations depending upon its physical inheritance, development, and training.

28. **Physical Measurements.** Second term. Credit one hour. Professor YOUNG. F 12. *Goldwin Smith* 248.

Measurements of school children; their practical application to problems of growth and development, together with tests of physical ability and proficiency.

29. **Anatomical Methods and Kinesiology.** First term. Credit three hours. Assistant Professor PAPEZ. One lecture and six hours of laboratory a week are required. Lecture, Th 12. *Stimson* 49; laboratory *Stimson* 52 (open any morning except Saturday). For juniors and seniors. See Animal Biology 229.

## PHYSICS

*For a major in Physics two alternative plans of study are offered.*

(A) *The following courses must be completed: (1) in Physics, twenty-one hours of unstarred courses of which at least nine hours shall be selected from courses 105, 111, 112, 120, 130, 160, 170; (2) in related subjects, Mathematics 4a and 4b, or 5a and 5b, and one of the following—Astronomy 181 and 184, Chemistry 101 and 105, Philosophy 3, 5, or 15 and 17, Psychology 1 and 3.*

(B) *The following courses must be completed: (1) in Physics, eighteen hours of unstarred courses including courses 60, 61, 62, 105; (2) in related subjects, four of the following—(a) Astronomy 181 and 184; (b) Biology A or Geology A; (c) Chemistry 101 and 105; (d) Mathematics 15; (e) Psychology 1 and 3.*

*It is desirable that a student majoring in Physics acquire a reading knowledge of German.*

## GENERAL COURSES

*Entrance credit in Physics does not carry with it University credit in Courses 3 and 4 or in 11 and 12. If a student desires credit for these courses, he must, before entering the University from a secondary school, pass an examination set by the Department of Physics. Permission to take this examination which is held in Ithaca on the same day in September as the entrance examination, must be obtained from the Director of Admissions.*

*Examinations for those who were unavoidably absent from either term examination and for those who have conditions to make up in courses 3 to 12 will be held on Monday, September 25, 1933, at 10 a.m. in Rockefeller A. Similar examinations in connection with Courses 21 to 62 will be held in Rockefeller A at 2 p.m. on the same day. Students expecting to take any of these examinations should notify the department not later than September 15, 1933.*

**\*3. Introductory Experimental Physics.** First term. Credit three hours. Lectures. Assistant Professor HOWE. *Rockefeller A.* Recitation and laboratory work, MESSRS. HAZLEWOOD, MANN, MESCHTER, RUEDY, SOUTHWORTH, TRAWICK, and WEEKES. *Rockefeller 220.*

Three plans of study will be offered, as follows:

(a) Primarily for students who do not offer physics for entrance. Demonstration lectures, W F 9 or 11. Laboratory, one two-hour period a week, to be arranged.

(b) Open only to students who offer physics for entrance. Demonstration lecture, M 9 or 11. Recitations, W F 9 or 11. Laboratory as in (a).

(c) Prerequisite, Trigonometry. Entrance physics desirable but not required. Lectures and recitations as in Course 11. Laboratory as in (a).

Properties of matter, sound, and light.

**\*4. Introductory Experimental Physics.** Second term. Credit three hours. Lectures. Professor MERRITT. *Rockefeller A.* A continuation of course 3. May be taken before course 3. Two plans of study will be offered, as follows:

(a) Lectures, W F 9 or 11. Laboratory, one two-hour period a week, to be arranged; (b) Lectures and recitations as in Course 12. Laboratory as in (a).

Electricity, magnetism, and heat.

**\*11. Introductory Experimental Physics.** First term. Credit four hours. Prerequisite, Trigonometry. Entrance physics desirable but not required.

Lecture, Assistant Professor GRANTHAM. Th 10 or 12. *Rockefeller A.* Two recitations and one laboratory period a week, to be arranged. Assistant Professor GRANTHAM, Dr. TEEPLE, and Messrs. CRAFTS, CREDLE, GILBERT, SCHOEFFLE, SIMPSON, and YERZLEY.

Mechanics, wave motion, sound, and light. Required of students in Engineering.

**\*12. Introductory Experimental Physics.** Second term. Credit four hours. A continuation of Course 11. May be taken before Course 11.

Demonstrations, theory, problems, and experiments covering the subjects of electricity, magnetism, and heat.

Required of students in Engineering.

**21. General Physics.** Either term. Credit three hours. Prerequisite Physics 11 and 12 and Mathematics 5a and 5b. Two classroom periods and one laboratory period on alternate weeks as assigned. Assistant Professors COLLINS and GRANTHAM, Messrs. MANNING, ROSE, and SMITH. *Rockefeller.*

Theory, problems and laboratory work covering selected topics in electricity and magnetism. Required of candidates for the degree of M.E. or E.E.

**22. General Physics.** Either term. Credit three hours. Prerequisite, Physics 11 and 12, and Mathematics 5a or 5b. Two classroom periods a week and one laboratory period on alternate weeks as assigned. Staff as in Course 21. *Rockefeller.*

Theory, problems, and laboratory work covering selected topics in thermionics, photoelectric effect, light and heat. Required of candidates for the degree of M.E. and E.E.

**31. General Physics.** First term. Credit two hours. Prerequisite, Physics 3 and 4 and Mathematics 5a and 7. Assistant Professor GRANTHAM and Mr. NELSON. *Rockefeller*. Two recitations, to be arranged.

Theory and problems covering selected topics in mechanics, wave-motion, and light. Required of candidates for B.Chem.

**32. General Physics.** Second term. Credit two hours. Prerequisite as for Physics 31. It is recommended that Physics 31 precede this course.

Theory and problems covering selected topics in heat, electricity, and magnetism. Required of candidates for B.Chem.

**34a. Physical Measurements.** Either term. Credit two hours. Prerequisite, Physics 3 and 4 and Mathematics 5a and 7. Physics 31 must accompany or precede this course. Assistant Professor GRANTHAM and Mr. NELSON. One laboratory a week to be arranged.

Physical measurements in properties of matter, mechanics, heat, light, and sound; the adjustment and use of instruments of precision. Required of candidates for B.Chem.

**34b. Physical Measurements.** Either term. Credit two hours. Prerequisite, as for Physics 34a, Physics 32 must accompany or precede this course.

Physical measurements in magnetism and electricity.

**\*55. Introductory Physical Experiments.** Either term. Credit three hours. Prerequisite, Physics 3 and 4 or the equivalent. Professor GIBBS and Dr. BARNES. T Th 1:40-4, W F 8-10:30, W F 1:40-4. *Rockefeller* 352.

Two laboratory periods a week, with reports. Fundamental experiments covering properties of matter, heat, light, sound, magnetism, and electricity. Primarily intended for students preparing for Medicine.

**60. Physical Experiments.** Either term or throughout the year. Credit three hours a term. Prerequisite, Physics 3 and 4 and Mathematics 3. Selected experiments available for those who have also had Mathematics 4. Desirable to consult instructor before registering. Professor GIBBS and Dr. WOOD and Mr. WILLIAMS. Three hours of laboratory work T and Th, between 8 and 1. *Rockefeller* 352.

Laboratory work in mechanics, properties of matter, heat, sound, light, electricity, and magnetism. Experiments selected to meet the needs of the individual student. For those with little training in Physics and Mathematics, emphasis will be placed upon the illustration of physical principles. For those qualified, opportunity will be given to study methods of measurement, sources of error, the adjustment and use of instruments of precision, and graphical methods of interpreting results. Primarily for students in Arts and Sciences. Suitable to accompany Physics 61 or 62 or both, but may be taken separately.

**61. General Physics.** First term. Credit three hours. Prerequisite, Physics 4 or the equivalent. Professor GIBBS. M W F 8. *Rockefeller* 107.

Primarily for students in Arts and Sciences. Classroom work covering heat, magnetism, and electricity.

Physics 61 and 62 are designed to meet the needs of students who desire a somewhat detailed survey of the fundamentals of physics. Physics 60 may suitably accompany either or both of these courses. A course in Trigonometry should precede or accompany Courses 61 and 62.

**62. General Physics.** Second term. Credit three hours. Prerequisite, Physics 3 or the equivalent. Professor GIBBS. M W F 8. *Rockefeller* 107.

Primarily for students in Arts and Sciences. Classroom work covering properties of matter, sound, and light.

Course 62 may be taken either before or after Course 61.

**[91. The Teaching of Physics in Secondary Schools.** Second term. Credit two hours. Prerequisite, Physics 60, 61, and 62. Mr. ————. Not given in 1933-34.]

**105. Advanced Laboratory Practice.** Either term. Credit three hours a term. Prerequisites, Physics 60, 61 and 62 and Mathematics 4. Professor MURDOCK and Messrs. CUYKENDALL, MINGINS, and SHAW. Laboratory, T W Th F afternoons as arranged. *Rockefeller* 324.

For undergraduates. Two laboratory periods and one seminar a week. Considerable time will be spent on each of a small number of experiments selected to meet the requirements of the individual student. The work may include such topics as electron measurements, ionization potentials, spectroscopy, x-rays, radio-activity, photoelectric emission, electric oscillations, and high temperature measurements.

**106. Advanced Laboratory Practice.** First and second term. Credit one to three hours, depending on the amount of work done. T W Th F afternoons as arranged. See Graduate School Announcement.

**[111. Mechanics.** First term. Credit three hours. Prerequisite, Physics 60 and 62, and Mathematics 4. Professor MURDOCK. This course is given in alternate years. Not given in 1933-34.]

**[112. Properties of Matter.** Second term. Credit three hours. Prerequisite, Physics 60 and 62. Professor MURDOCK. This course is given in alternate years. Not given in 1933-34.]

**120. Electricity and Magnetism.** Throughout the year. Credit three hours a term. Prerequisite, Physics 60, 61, and 62 and Mathematics 4, Professor MURDOCK. M W F 8. *Rockefeller C.* This course is given in alternate years.

A study of the laws of electrostatic and magnetic fields; electro-magnetism and electromagnetic waves; thermal and chemical electromotive forces; metallic, electrolytic, and gaseous conduction.

**130. Light.** Second term. Credit three hours. Prerequisite, Physics 60 and 62 and Mathematics 4, or the equivalent. Assistant Professor HOWE. T Th S 10. This course is given in alternate years.

An introductory study of geometrical and physical optics based on Houston's "Light."

**160. Wave Motion and Sound.** First term. Credit three hours. Prerequisite, Physics 60 and 62 and Mathematics 4, or the equivalent. Assistant Professor COLLINS. T Th S 10. *Rockefeller C.* This course is given in alternate years.

The general properties of wave motion; a comparative study of elastic waves, waves on the surface of liquids, and sound waves; a detailed study of sound, based on Wood's "Textbook of Sound."

**[170. Introduction to Modern Physical Theories.** Throughout the year. Credit three hours a term. Prerequisite, Physics 120 or 130, or the equivalent. Professor RICHTMYER. This course is given in alternate years. Not given in 1933-34.]

**211. Theoretical Mechanics.** Throughout the year. Credit three hours a term. Prerequisite, Physics 111 or the equivalent. Primarily for graduates. Assistant Professor COLLINS. T Th S 8. See Graduate School Announcement.

**[220. Electromagnetic Theory.** Throughout the year. Credit three hours a term. Prerequisite, Physics 120 or the equivalent. Primarily for graduates. Professor KENNARD. This course is given in alternate years. Not given in 1933-34.]

**[230. Theoretical Optics.** Throughout the year. Credit three hours a term. Prerequisite, Physics 130 or the equivalent. Primarily for graduates. Assistant Professor COLLINS. Not given in 1933-34.]

**242. Thermodynamics and Statistical Mechanics.** Second term. M W F 9. Professor KENNARD. See Graduate School Announcement.

**300. Physics Seminary.** Throughout the year. Credit one hour a term. For seniors and graduates. Professor MERRITT. M 3:15. *Rockefeller C.*

#### SPECIAL TOPIC COURSES

**405. Mathematical Methods in Physics.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 4a and 4b or the equivalent. Assistant Professor SMITH. T Th S 11. See Graduate School Announcement.

**415. Special Topics in Physics.** A reading course. See Graduate School Announcement.



[460. **Kinetic Theory of Matter.** First term. Credit three hours. Professor KENNARD. Given in alternate years. Not given in 1933-34.]

474. **Quantum Mechanics.** First term. T Th S 10. Professor KENNARD. See Graduate School Announcement.

475. **Quantum Mechanics of Spectra and Radiation.** Second term. Prerequisite, Physics 474. T Th S 10. Professor KENNARD. See Graduate School Announcement.

[476. **Quantum Mechanics.** First term. Credit three hours. Prerequisite, Physics 474. Assistant Professor SMITH. Not given in 1933-34.]

[480. **Advanced Quantum Mechanics.** Second term. Credit three hours. Prerequisite, Physics 474. Professor KENNARD and Assistant Professor SMITH. Not given in 1933-34.]

525. **Thermodynamics.** Throughout the year. Credit three hours a term. Prerequisite, Mathematics 41. Mathematics 42 is recommended. Professor TREVOR. Day and hour to be arranged.

571. **Spectroscopy.** Throughout the year. Credit two hours a term. Professor GIBBS. W F 12. Given in alternate years. See Graduate School Announcement.

573. **Spectroscopy.** Second term. Credit variable. Professor GIBBS and Mr. SHAW. See Graduate School Announcement.

[581. **Atomic Structure.** Second term. Credit three hours. Professor GIBBS. Given in alternate years. Not given in 1933-34.]

591. **X-rays and the Structure of Matter.** First term. M W F 10. Professor RICHTMYER. See Graduate School Announcement.

[592. **X-rays and the Structure of Matter.** Second term. M W F 10. Professor MURDOCK. Not given in 1933-34. See Chemistry 1000.]

593. **X-rays.** Second term. Credit two hours. Prerequisite, first term of Physics 120 or equivalent. Professor RICHTMYER. T Th afternoons. *Rockefeller* 324.

Laboratory work for a limited number of students. The production and effects of X-rays, methods of study and measurement; X-ray spectroscopy.

[595. **Diffraction of X-rays by Crystals.** Second term. Credit three hours. Prerequisite, Physics 34 or 60. Lectures and laboratory work for a limited number of students. Professor MURDOCK. Not given in 1933-34.]

611. **Electric Waves and Oscillations.** First term. Credit one hour. Prerequisite, Introductory Physics. Professor MERRITT. M 12.

Experimental lectures. Given in alternate years.

612. **Special Topics in Recent Experimental Physics.** Second term. Prerequisite, Introductory Physics. Professors GIBBS and MURDOCK, and Assistant Professor COLLINS. M 12. Alternates with Physics 622.

613. **Electric Waves and Oscillations.** Second term. Laboratory. Credit one to four hours. Prerequisite, Physics 60 and 611, or the equivalent. Professor MERRITT and Mr. MINGINS. Day and hour to be arranged.

[621. **Electric Conduction in Gases.** Prerequisite, Introductory Physics. Professor MERRITT. Experimental lectures. Given in alternate years. Not given in 1933-34.]

[622. **Special Topics in Recent Experimental Physics.** Second term. Alternates with Physics 612. Not given in 1933-34.]

[627. **Electrical Conduction in Gases.** First term. Credit four hours. Prerequisites, Physics 60, 61 and 62 or the equivalent. Assistant Professor SMITH. Not given in 1933-34.]

633. **Alternating Currents.** First term. Credit two hours. Prerequisite, Physics 34 or the equivalent. Professor BEDELL and Dr. RICHARDS. T Th 11. *Rockefeller* 155.

A study of the underlying principles of alternating currents; the development of graphical methods of analysis as a basis for testing and for the solution of practical problems.

634. **Electrical Laboratory.** Either term, or throughout the year. Credit variable. Prerequisite, Physics 34 or the equivalent. Professor BEDELL and Dr. RICHARDS. Hours as arranged. *Rockefeller.*

Direct and alternating current measurement, and the investigation of special problems. The character of the work will be varied to meet individual needs.

[636. **Advanced Alternating Currents.** Second term. Credit two hours. Prerequisite, Physics 633. Professor BEDELL. Not given in 1933-34.]

## PSYCHOLOGY

*For a major in Psychology, the following courses must be completed: (1) in Psychology, courses 1, 2, 3a or 3b, 5 or 6, either 11 or 16 or 17; either 18 or 14; either 10 or 12 or 15; (2) in related subjects, courses to be selected from the following list in consultation with the adviser: Biology 1, 7, 11, 14, 17, 20, 25, 101, 102, 104, 221, 225, 226, 300, 301, 303, 307, 314; Botany 124; Chemistry 101, 105, 375, 405; Education 1, 5, 7, 8, 17 and 18; Geology 400; Mathematics 4a, 4b, 83; Music 5; Philosophy 2, 5, 15; Physics 3, 4; Social Science 50a, 50b.*

*Students who wish to take course 1 or course 2 should go, on one of the registration days, to Morrill Hall, north entrance, third floor, for assignment to seats and sections.*

\*1. **Elementary Psychology.** Repeated in second term. Credit three hours. Not open to freshmen. Lectures, *Goldwin Smith C.* First term: T Th 11, M W 12, Assistant Professor JENKINS. Second term: M W 12, Assistant Professor JENKINS. Recitations, one hour a week, to be arranged. Dr. FELDMAN and assistants.

2. **General Psychology.** Second term. Credit three hours. Prerequisite, Psychology 1. Professor WELD, Dr. FELDMAN, and assistants. Lectures, T Th 11. *Goldwin Smith C.* Recitations, one hour a week, to be arranged.

Problems and methods of general psychology and of the special fields, differential, abnormal, animal, genetic, social, and applied.

3a, 3b. **Introductory Laboratory.** 3a first term, 3b second term. May be entered either term. Credit three hours a term. Prerequisite, Psychology 1. Professor DALLENBACH and Assistant Professor JENKINS. M W F 2-4. *Morrill, Psychological Laboratory.* Laboratory fee, \$2 a term.

4. **The Psychophysical and Correlational Methods.** First term. Credit three hours. Prerequisite, Psychology 3a or 3b. Professor DALLENBACH. M W F 2-4. *Morrill, Psychological Laboratory.*

5. **Perception.** First term. Credit three hours. Prerequisite, Psychology 1 and consent of the instructor. Dr. FELDMAN. M W F 9. *Morrill 42.*

Lectures on the experimental psychology of the perception of objects, space, movement, and time.

6. **Memory, Skill, and Work.** Second term. Credit three hours. Prerequisite, Psychology 1 and consent of the instructor. Dr. FELDMAN. M W F 9. *Morrill 42.*

Lectures on the experimental psychology of memory and habit.

7. **Reading of German Psychology.** Second term. Credit three hours. Prerequisite, consent of the instructor. Hours to be arranged. Dr. FELDMAN. *Morrill, Psychological Laboratory.*

8. **Technique of Experimentation.** Second term. Credit three hours. Primarily for graduate students. *Morrill, Research Laboratory.*

9. **Experimental and Historical Problems.** Either term or throughout the year. Credit three hours a term. Prerequisite, 1, 3a and either 3b or 4, and the consent of the instructor. Professors BENTLEY, WELD, and DALLENBACH, and Assistant Professor JENKINS. *Morrill, Psychological Laboratory.*

10. **Social Psychology.** Second term. Credit three hours. Prerequisite, senior standing and consent of the instructor. Professor WELD. M W F 10. Morrill 41.

11. **Physiological Psychology.** First term. Credit three hours. Prerequisite, Psychology 1 and consent of the instructor. Professor DALLENBACH. M W F 10. Morrill 42.

Lectures and demonstrations on the experimental psychology of the special senses together with a study of the nervous structures involved.

12. **Legal Psychology.** First term. Credit three hours. Prerequisite, Psychology 1. Intended for juniors preparing for the law. Professor WELD. M W F 11. Boardman Hall B.

Psychological aspects of the origin and growth of the law, and of legal theory; psychological problems of evidence and responsibility.

13. **History of Experimental Psychology.** First term. Credit three hours. Prerequisite, senior standing and consent of the instructor. Professor WELD. M W F 10. Morrill 41.

14. **Contemporary Psychology.** First term. Credit three hours. Prerequisite, senior standing and consent of the instructor. Professor OGDEN. T Th S 11. Morrill 41.

15. **Psychology of the Abnormal.** First term. Credit three hours. Prerequisite, senior standing and consent of the instructor. Professor BENTLEY. M W F 10. Morrill 59.

An account of the deficiencies, excesses, and aberrations of the psychological functions. The psychoneuroses and psychological disorders.

16. **Applications of Psychology.** Second term. Credit three hours. Prerequisite, Psychology 1 and consent of the instructor. Assistant Professor JENKINS. T Th S 11. Morrill 42.

A critical review of the attempts to apply psychological facts and methods to the solution of technological problems.

17. **Animal Psychology.** Second term. Credit three hours. Prerequisite, consent of the instructor. Professor BENTLEY. M W F 10. Morrill 41.

The comparative psychology of vertebrate and invertebrate forms. Lectures, discussions, and demonstrations.

## PUBLIC SPEAKING

*For a major in Public Speaking, the following courses must be completed: (1) in Public Speaking, twenty-one hours including nine hours from courses 1, 2, 10, 30; (2) in related subjects, six hours of courses not taken in the freshman year in each of the following groups—(a) English, Comparative Literature; (b) History, Government, Economics; (c) Philosophy. Students may elect a general major, or a major with emphasis on (1) Rhetoric and Public Speaking, (2) Phonetics and Speech Training, (3) Drama and the Theatre.*

*For prospective teachers: Students planning to teach Public Speaking should satisfy at least minimum requirements for a teacher of English, and should begin the required courses in Education in the sophomore year with Psychology 1 and Education 1. For those preparing to teach English: Public Speaking, 1, 10, 30 (and 12 and 41) offer basic training for the Oral English work required of teachers of English in the secondary schools.*

*Additional opportunities for training under the supervision of the department are provided by the University Prize Contests (the Woodford, the '86 Memorial, the '94 Memorial) in charge of Assistant Professor MUCHMORE, by the intercollegiate debate teams under the supervision of Assistant Professor WAGNER, and by the Cornell Dramatic Club and Laboratory Theatre under the direction of Professor DRUMMOND and Assistant Professor STANTON.*

\*1. **Public Speaking.** Repeated in second term. Credit three hours. Not open to freshmen. Professor WICHELNS, Assistant Professors MUCHMORE, WAGNER, and THOMAS, Mr. WALLACE. First term: M W F 9, 10, 11, 12; T Th S 9, 10, 11. Second term: M W F 9, 10, 11, 12; T Th S 9, 10.

Planned to give the fundamentals of speech preparation and to develop simple and direct speaking. Study of principles, and constant practice; readings on public questions; conferences; drills.

Students must enroll on registration day at *Goldwin Smith* 234.

\*2. **Public Speaking.** Second term. Credit three hours. Prerequisite, Public Speaking 1. Professor WICHELS, Assistant Professors MUCHMORE and WAGNER. M W F 9, 10, 12; T Th S 9.

A continuation of course 1, with attention to the problem of persuasion.

The '86 Memorial Prize is awarded in connection with this course.

Students must enroll on registration days at *Goldwin Smith* 234.

\*8. **Voice Training.** Second term. Credit one hour. Open to freshmen. Assistant Professor THOMAS. T Th 9. *Goldwin Smith* 26.

An elementary course for the improvement of the speaking voice, with attention to the principles of voice production.

Students with special vocal problems are advised to take this course before taking course 1.

Students must enroll on registration days at *Goldwin Smith* 23.

10. **Oral Interpretation of Literature.** Repeated in second term. Credit three hours. Not open to freshmen. Assistant Professor THOMAS. First term: two sections; M W F 9, M W F 10; second term: M W F 9. *Goldwin Smith* 26.

Training in the interpretative reading of prose and poetry; study of principles; constant practice; conferences for drill.

Students must enroll on registration days at *Goldwin Smith* 234.

12. **Argumentation.** First term. Credit three hours. Prerequisite, Public Speaking 1. Three sections: Professor WICHELS, T 11, Th 11-1, *Goldwin Smith* 26; Assistant Professor WAGNER, M W F 11, M W F 12, *Goldwin Smith* 21.

Training in reasoning, and in the composition of argument both written and spoken; practice in debate.

This course is recommended by the department to students preparing for the law.

Students must enroll on registration days at *Goldwin Smith* 234.

13. **Advanced Argumentation.** Second term. Credit three hours. Prerequisite, Public Speaking 12 and the consent of the instructor. Assistant Professor WAGNER. M W F 12. *Goldwin Smith* 21.

Students must enroll on registration days at *Goldwin Smith* 237.

[15. **Advanced Public Speaking.** First term. Assistant Professor MUCHMORE. Not given in 1933-34.]

16. **Forms of Address.** Second term. Credit three hours. Prerequisite, two terms of practice in public speaking (in courses 1, 2, or 12). Assistant Professor MUCHMORE. M W F 10. *Goldwin Smith* 26.

Training in the composition and delivery of various types of public address; reading of representative speeches.

Students must enroll on registration days at *Goldwin Smith* 233.

23. **Classical Rhetoric.** First term. Credit three hours. Open to upperclassmen. Professor WICHELS. T 2-4 and an hour to be arranged. *Goldwin Smith* 236.

A study, in English translation, of ancient theories of public address, with special reference to Aristotle, Cicero, and Quintilian. Lectures, discussions, and reports.

Students must enroll on registration days at *Goldwin Smith* 235.

24. **Public Opinion and the Method of Argument.** Second term. Credit three hours. Open to upperclassmen. Professor WICHELS. T 11, Th 11-1. *Goldwin Smith* 248.

Public opinion and its formation studied with reference to the modern theory and practice of public address.

Students must enroll on registration days at *Goldwin Smith* 235.

25. **British Orators.** First term. Credit three hours. Open by consent of the instructor. Assistant Professor WAGNER. T 11, Th 11-1. *Goldwin Smith* 248. Students must enroll on registration days at *Goldwin Smith* 237.

[27. **American Orators.** Not given in 1933-34.]

30. **Phonetics and Speech Training.** First term. Credit three hours. Open by consent of the instructor. Assistant Professor THOMAS. T Th S 10. *Goldwin Smith* 26.

Principles of phonetics; study of English pronunciation, based chiefly on contemporary American usage; practice in phonetic analysis and, where necessary, drill for the improvement of individual speech.

Foreign students and others whose pronunciation of English falls below the normal standard are advised to take this course before taking course 1.

Students must enroll on registration days at *Goldwin Smith* 23.

31. **Advanced Phonetics and Speech Training.** Second term. Credit three hours. Prerequisite, Public Speaking 30 or the equivalent. Assistant Professor THOMAS. T Th S 10. *Goldwin Smith* 26.

Principles of general phonetics; regional variations and historical changes in standards of speech; methods of improving normal and defective speech.

This course is recommended by the department to those intending to teach oral English, public speaking, and dramatics.

41. **Dramatic Interpretation.** First term. Credit three hours. Open to upperclassmen by consent of the instructor. Assistant Professor STANTON. M W F 12. *Morse*, Stage Laboratory.

Dramatic interpretation, and the related principles of stage direction and production. Lectures, readings, reports, and drill.

45. **Dramatic Production: Stagecraft.** Second term. Credit three hours. Prerequisite, Public Speaking 41 and the consent of the instructor. Assistant Professor STANTON. M W 12; T 1:40-4, or as arranged. *Morse*, Stage Laboratory.

The theory and practice of stage production. Lectures, demonstrations, reports, and laboratory exercises in stagecraft.

[48. **History of the Theatre.** Second term. Professor DRUMMOND. Not given in 1933-34.]

49. **Playwriting.** Throughout the year. Credit three hours a term. Open to upperclassmen by consent of the instructor. Professor DRUMMOND. T Th 12. *Goldwin Smith* 242.

51. **Problems and Methods.** First term. Credit two hours. Open to seniors by consent of the instructor. Professor DRUMMOND. W 2-4. *Goldwin Smith* 21.

A survey of fundamental ideas on the practice and pedagogy of public speaking, speech training, and dramatic production.

This course is recommended by the department to those intending to teach oral English, public speaking, and dramatics.

66. **Theories of Dramatic Production.** Second term. Credit two hours. Open to seniors by consent of the instructor. Professor DRUMMOND. W 2-4. *Goldwin Smith* 242.

A study of the chief theories of dramatic production in relation to aesthetic principles.

90. **Theatre Practice.** Throughout the year. Credit two hours a term. Open by consent of the instructors to juniors majoring in the department who have taken or are taking Public Speaking 41 or 45. Hours to be arranged. Professor DRUMMOND and Assistant Professor STANTON.

Individual projects in dramatic production definitely correlated with the theoretical work of the prerequisite courses.

91. **Theatre Practice.** Throughout the year. Credit two hours a term. Open by consent of the instructors to seniors majoring in the department who have taken Public Speaking 41, and either 45, 49 or 66. Hours to be arranged. Professor DRUMMOND and Assistant Professor STANTON.

Individual projects in dramatic production definitely correlated with the theoretical work of the prerequisite courses.

**Speech Clinic.** For students working under the supervision of the Department. By appointment. Assistant Professor THOMAS. *Goldwin Smith* 23.

**Informal Study and Theses.** Qualified seniors may, with the approval of the department, register for informal study or theses in rhetoric, public address, speech training, or dramatic production.

## ROMANCE LANGUAGES

*For a major in French or Spanish, the following courses must be completed: (1) in French or Spanish, twenty-one hours of unstarred courses in the language; (2) in related subjects, eighteen hours to be selected from courses in Greek, Latin, Ancient and European History, German, History of Philosophy, English.*

*For a major in French and Italian, Spanish and Italian, French and Spanish, Spanish and French, the following courses must be completed: (1) in the first language mentioned, fifteen hours of unstarred courses, and in the second language, nine hours of unstarred courses; (2) in related subjects, eighteen hours to be selected from courses in Greek, Latin, Ancient and European History, German, History of Philosophy, English.*

### FRENCH

*Students desiring the recommendation of the Department for teaching French are required to take the following courses: 16, 22, 23, 30 and a minimum of six hours of composition above French 5b.*

\*1. **Elementary Course.** Throughout the year. Credit six hours on completion of the course; upperclassmen, four hours. M W F 12, T Th S 8.

This course is continuous throughout the year and no credit is allowed for the first term alone. Students with first year entrance French should enter the course the second term.

\*3. **Intermediate Course.** First term only. Credit six hours; upperclassmen, four hours. Prerequisite, French 1, or second year entrance French. Daily 8.

\*3a. **Intermediate Course.** Throughout the year. Credit six hours on completion of the course; upperclassmen, four hours. Prerequisite, French 1, or second year entrance French. T Th S 12, M W F 11.

This course is the same in content as French 3.

\*4a. **Rapid Reading of French.** Repeated in second term. Credit three hours. Prerequisite, French 3, or third year entrance French. First term: M W F 9, M W F 12, T Th S 11. Second term: M W F 10, T Th S 9.

Translation and rapid reading.

Designed primarily for students intending to continue the study of French. May not be taken except in conjunction with 5a.

\*4b. **Advanced Rapid Reading of French.** Second term. Credit three hours. Prerequisite, French 4a or its equivalent. T Th S 11.

Translation and rapid reading.

\*5a. **Elementary Composition.** Repeated in second term. Credit three hours. Prerequisite, French 3, or third year entrance French. First term: M W F 11, T Th S 9, T Th S 12. Second term: M W F 8, M W F 9, T Th S 10.

\*5b. **Elementary Composition.** Second term. Credit three hours. Prerequisite, fourth year entrance French or French 5a or 6. M W F 11, T Th S 9, T Th S 10. *Goldwin Smith* 283.

\*6. **Freshman French: Reading and Composition.** Throughout the year. Credit six hours on completion of course. Prerequisite, French 3 or third year entrance French. Designed primarily for the satisfaction of underclass requirements in foreign languages. M W F 8, 9, 10, 12; T Th S 9, 10, 11.

\*7. **Intermediate Composition.** Throughout the year. Credit three hours a term. Prerequisite, French 5b. Professor PUMPELLY. M W F 10, M W F 12. *Goldwin Smith* 277.

Composition, conversation and discussion of selected topics in French grammar. Course 7 is conducted in French.

9. **Advanced Composition.** Throughout the year. Credit three hours a term. Prerequisite, French 7. Assistant Professor PELMONT. M W F 10. *Goldwin Smith* 283.

Rapid translation from English; themes and talks by students on literary and historical topics. The course is conducted in French.

16. **History of French Literature.** Throughout the year. Credit three hours a term. Prerequisite, fourth year entrance French, French 4a, or French 6. Professor MASON. M W F 11. *Goldwin Smith* B.

Lectures on French Literature since the Middle Ages.

17. **Literature of the Seventeenth Century.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Assistant Professor BISHOP. M W F 11. *Goldwin Smith* 281.

Lectures, outside reading, and reports.

18. **Literature of the Eighteenth Century.** Throughout the year. Credit three hours. Prerequisite, French 16. Professor —. M W F 11. *Goldwin Smith* 281.

Lectures, outside reading, and reports. Not given in 1933-34.]

19. **The Romantic Movement in French Literature.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor MASON. M W F 9. *Goldwin Smith* 290.

20. **Modern French Literature.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor MASON. M W F 9. *Goldwin Smith* 290. Not given in 1933-34.]

21. **Contemporary French Literature.** Throughout the year. Credit three hours a term. Prerequisite, French 16. Professor MASON. M W F 9. *Goldwin Smith* 290. Not given in 1933-34.]

22. **French Phonetics.** Second term. Credit two hours. Professor MASON. M W 8. *Goldwin Smith* 281. Not given in 1933-34.]

23. **French Historical Grammar.** First term. Credit two hours. Professor PUMPELLY. T Th 10. *Goldwin Smith* 277.

Lectures on the historical development of French from its origins to the present. Primarily for students intending to teach French.

24. **French Philology.** Throughout the year. Credit six hours on completion of course. Prerequisite, French 5a, 23, and entrance Latin. Professor PUMPELLY. T 10, Th 2. *Goldwin Smith* 277.

Lectures on the historical development of the French language, with a detailed phonological and morphological study of the *Chanson de Roland*. Not given in 1933-34.]

30. **The Teaching of French.** Second term. Credit two hours. Professor MASON. M W 8. *Goldwin Smith* 281.

31. **Literature of the Sixteenth Century.** Throughout the year. Credit two hours a term. Prerequisite, French 16. Assistant Professor BISHOP. T Th 12. *Goldwin Smith* 283. Not given in 1933-34.]

35. **French Critics,** Lectures in French. First term. Credit two hours. Professor —. T Th 11. *Goldwin Smith* 283. Not given in 1933-34.]

36. **France of To-day,** Lectures in French. Second term. Credit two hours. Professor —. T Th 11. *Goldwin Smith* 283. Not given in 1933-34.]

41. **Old French Texts.** First term. Credit two hours. Primarily for graduates. Hours to be arranged. Professor HAMILTON. Not given in 1933-34.]

43. **Old Provençal Philology and Literature.** Second term. Credit two hours. Hours to be arranged. Professor HAMILTON.

47. **Modern French Seminary.** Throughout the year. Credit two hours a term. Professor MASON. T 2:30. *Library, French Seminary.* Primarily for graduates.

## ITALIAN

\*1. **Elementary Course.** Throughout the year. Credit six hours on completion of course. Professor PUMPELLE. M W F 9. *Goldwin Smith* 283.

The course is continuous throughout the year and no credit will be allowed for the first term alone.

4. **Nineteenth Century Literature.** Throughout the year. Credit three hours a term. Prerequisite, Italian 1, or its equivalent. Professor HAMILTON. T Th S 9. *Goldwin Smith* 281.

Novels and criticism of the nineteenth century.

14. **Italian Poetry.** Throughout the year. Credit three hours a term. Prerequisite, Italian 4, or the equivalent. Professor HAMILTON. T Th 11. *Goldwin Smith* 281.

Dante, *Divina Commedia*; Leopardi, *Rime*; Carducci, *Poesie*, will be read in class. Readings and reports for extra-class work.

15. **The Literature of the Italian Renaissance.** Second term. Credit three hours. Prerequisite, Italian 14. Professor HAMILTON. Hours and room to be arranged.

Petrarch, *Rime*; Machiavelli, *Principe*; Ariosto, *Orlando Furioso*. Outside readings and reports.

## SPANISH

\*1. **Elementary Course.** Throughout the year. Credit six hours on completion of the course; upperclassmen, four hours. M W F 12, T Th S 9.

The course is continuous throughout the year and no credit is allowed for the first term alone. Students entering with one unit in Spanish should take the second term of course 1.

\*3. **Intermediate Course.** Credit six hours; upperclassmen, four hours. Prerequisite, Spanish 1, or second year entrance Spanish. Mr. ESPINOSA. First term: daily 8.

\*4. **Advanced Translation.** Second term. Credit three hours. Prerequisite Spanish 3, or third year entrance Spanish. T Th S 10.

Translation, outside reading of modern novels and plays.

\*5. **Elementary Composition.** Second term. Credit three hours. Prerequisite, Spanish 3 or third year entrance Spanish. Mr. ESPINOSA. T Th S 11.

\*6. **Freshman Spanish.** Translation and composition. Throughout the year. Credit six hours on completion of the course. Prerequisite, Spanish 3 or third year entrance Spanish. Designed primarily for the satisfaction of the under-class requirement in foreign language. M W F 9.

7a. **Intermediate Composition.** First term. Credit three hours a term. Prerequisite, Spanish 4 or 6. Mr. ESPINOSA. T Th S 12. *Goldwin Smith* 277.

7b. **Intermediate Composition.** Second term. Credit three hours a term. Prerequisite, Spanish 7a. Mr. ESPINOSA. T Th S 12. *Goldwin Smith* 281.

Courses 7a and 7b are conducted in Spanish. Special emphasis is placed on the attainment of accuracy and fluency in both written and oral expression.

10. **History of Spanish Literature.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. M W F 12. *Goldwin Smith* 283.

15. **Drama of the Golden Age.** First term. Credit three hours. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 11. *Goldwin Smith* 277.

17. **Cervantes.** Second term. Credit three hours. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 11. *Goldwin Smith* 277.

[19. **Prose of the Nineteenth Century.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 10. *Goldwin Smith* 281. Not given in 1933-34.]

[20. **Spanish Poetry.** Throughout the year. Credit three hours a term. Prerequisite, Spanish 4 or 6. Professor DALE. T Th S 10. *Goldwin Smith* 281. Not given in 1933-34.]



[41. **Old Spanish.** Throughout the year. Credit two hours. Professor DALE. Primarily for graduates. Th 2:15. *Library, Spanish Seminary.* Not given in 1933-34.]

[42. **Calderón and Alarcón.** Throughout the year. Credit two hours. Professor DALE. Primarily for graduates. Th 2:15. *Library, Spanish Seminary.* Not given in 1933-34.]

43. **The Picaresque Novel.** Throughout the year. Credit two hours a term. Professor DALE. Primarily for graduates. Th 2:15. *Library, Spanish Seminary.*

### SCANDINAVIAN LANGUAGES AND LITERATURES

*For a major in Scandinavian Languages and Literatures, the following courses must be completed: in Scandinavian Languages and Literatures, courses 1, and 3 or 4, and six other hours; (2) in related subjects, twenty-two hours selected from the following courses: German 15, 16, 17, 37, 42, 43, 48; English 32, 38, 40, 50, 54, 64, 74; History 23, 32, 36, 42; Comparative Study of Literature 3, 4; The Classics—Latin 30, 49.*

1. **Old Icelandic.** Second term. Credit three hours. Professor HERMANNSSON. T Th S 11. *Library, Greek and Latin Seminary.*

2. **Modern Icelandic.** Second term. Credit three hours. Hours to be arranged. Professor HERMANNSSON.

3. **Danish and Dano-Norwegian.** Second term. Credit three hours. Professor HERMANNSSON. M W F 11. *Library, Greek and Latin Seminary.*

[4. **Swedish.** First term. Credit three hours. Professor HERMANNSSON. Not given in 1933-34.]

[5. **Old Norse-Icelandic Literature.** First term. Credit two hours. Professor HERMANNSSON. Not given in 1933-34.]

6. **Modern Scandinavian Literature.** Second term. Credit two hours. Professor HERMANNSSON. W F 12. *Boardman B.*

Lectures on Norwegian literature (Holberg, Ibsen, Björnson, etc.)

[7. **Early Scandinavian Civilization and History.** Second term. Credit two hours. Professor HERMANNSSON. Not given in 1933-34.]

## UNIVERSITY REQUIREMENTS FOR THE DEGREE A.B. AND B.CHEM.

### HYGIENE AND PREVENTIVE MEDICINE

All undergraduate students are required to present themselves to the Medical Advisers and receive a thorough confidential physical examination once a year. Appointments for this examination must be made during the regular registration days of the first term by all entering students and sophomores, A through M. Appointments for this examination must be made during the regular registration days of the second term by all juniors, seniors, and sophomores, N through Z.

All students in the first year of undergraduate courses are required to attend a lecture-recitation course in Hygiene and Preventive Medicine given once a week throughout the college year. In the College of Arts and Sciences academic credit of one hour, each term, will be given for satisfactory completion of this work. The credit of two hours for Hygiene 1 and 2 will be included in the one hundred and twenty hours required for the A.B. degree, and added to the requirements for the B.Chem. degree (see page 17).

Hygiene 1 and 2, however, as well as Hygiene 3, 4, and 5 may not be counted in the ninety hours required in the College of Arts and Sciences, but must be counted as part of the thirty hours of electives allowed outside the College (see paragraph 1, page 11).

1. **Hygiene.** First term. Required of all freshmen. Credit one hour. One lecture-recitation each week, with preliminary examination and final. The use of a text-book will be required.

Students must report for registration and assignment to section, the men at the *Old Armory*, the women at *Sage Gymnasium*.

Sections for Men: Professor SMILEY, Assistant Professors GOULD, SHOWACRE, YORK, and Drs. HAWKINS and ROBINSON.

Sections for Women: Assistant Professor EVANS, Dr. CUYKENDALL and Dr. EDMUNDS.

2. **Hygiene.** Second term. Required of all freshmen. Credit one hour. One lecture-recitation each week, with preliminary examination and final. The use of a text-book will be required.

Students must report for registration and assignment to section, the men at the *Old Armory*, the women at *Sage Gymnasium*.

Sections for Men: Professor SMILEY, Assistant Professors GOULD, SHOWACRE, YORK, Drs. HAWKINS and ROBINSON.

Sections for Women: Assistant Professor EVANS, and Drs. CUYKENDALL and EDMUNDS.

3. **Health Supervision of School Children.** Second term. Credit two hours Assistant Professor GOULD. T Th 12. Histology lecture room, *Stimson*. Registration at Hygiene Office, *Old Armory*.

A practical course of lectures and demonstrations designed to familiarize the student with the facts and methods necessary for making an effective health supervision of school children. Prerequisites, suggested but not demanded: Human Physiology and Anatomy. Open to sophomores, juniors, and seniors.

4. **Hygiene: Advanced First Aid.** Credit one hour. First term. Repeated in second term. Prerequisites, Hygiene 1 and 2, and Human Anatomy or Human Physiology. Enrollment limited, and registration only after conference with the professor in charge. First term: F 9, *Anatomy Lecture Room, Stimson*. Second term: S 9, *Anatomy Lecture Room, Stimson*. Assistant Professor SHOWACRE.

This course includes the theory of the diagnosis and temporary treatment of the common emergencies with practical application of the essential fundamentals.

5. **Industrial Hygiene.** First term. Credit one hour. Assistant Professor GOULD. Th 12. Histology lecture room. *Stimson*. Registration at Hygiene Office, *Old Armory*. Prerequisites, Hygiene 1 and 2.

Factory sanitation, ventilation and illumination; occupational poisoning and disease; factory legislation; accident prevention; fatigue in industry; preventive medicine in the industries.

6. **School Hygiene.** Professor YOUNG. See Physical Education 24.

*The following courses, Hygiene 7 and 8, may not be included in the one hundred and twenty hours required for the A.B. degree.*

7. **Hygiene: Rural Hygiene.** Second term. Credit one hour. Prerequisites, Hygiene 1 and 2. W 12. *Anatomy lecture room, Stimson*. Registration at Hygiene office, *Old Armory*. Professor SMILEY.

A general consideration of the health problems peculiar to rural areas with the presentation of practical schemes for the solution of these problems as far as possible.

8. **Hygiene: Mental Hygiene.** First term. Repeated in second term. Credit two hours. Prerequisites, Hygiene 1 and 2. Section 1. T Th 2. *Histology Lecture Room, Stimson*. Assistant Professor YORK. Section 2. W F 2. *Histology Lecture Room, Stimson*. Assistant Professor EVANS.

A study of the factors involved in the maintenance of mental health of the individual: i. e., satisfactory human relationships, attitudes, and behavior. Discussion of the causes and mechanisms underlying the more common personality deviations.

## MILITARY SCIENCE AND TACTICS

1. **Practical and Theoretical Training.** Throughout the year. Every able-bodied male student (except aliens), a candidate for a baccalaureate degree, who is required to take five, six, seven, eight, or more terms in residence (or the equivalent in scholastic hours), must take in addition to the scholastic requirements for the degree, one, two, three, or four terms respectively in the Department of Military Science and Tactics. Three hours a week, either M T W or Th 1:40-4:10 p. m. *New York State Drill Hall*.

The requirements in Military Science and Tactics must be completed in the first terms of residence; otherwise the student will not be permitted to register again in the University without the consent of the University Faculty.

The course of training is that prescribed by the War Department as basic for Infantry and Field Artillery Branches of the Reserve Officers' Training Corps. The Infantry includes instruction in military courtesy, command and leadership, physical training, ceremonies, rifle marksmanship, automatic rifle, musketry, scouting and patrolling, grenades, machine guns, the fundamental principles of minor tactics and leadership, and the National Defense Act. The Field Artillery includes instruction in organization of the battery, customs of the service, military courtesy and discipline, dismounted drill, drill of the gun squad including service of the piece, gunner's examination, hippology, equitation and horsemanship, physical training, and topography.

2. **Elective Military Training.** Throughout the year. Credit two hours a term. Hours by assignment. *New York State Drill Hall*.

This is the advanced course prescribed by the War Department for units of the Reserve Officers' Training Corps, and includes five hours of practical and theoretical instruction a week and, in addition, the attendance at one summer camp training period of six weeks duration. Normally this training is given in the summer following the completion of the first year of the advanced course. Those students who intend to accept a commission in the Officer's Reserve Corps upon the completion of the advanced course training, will be certified as eligible to receive commutation of subsistence from the United States government for the duration of their participation in the course.

Course 2 may be elected only by permission of the Dean of the College of Arts and Sciences, and the Professor of Military Science and Tactics. Credit for the course may not be counted toward the ninety hours required in this College (see page 11).

### PHYSICAL TRAINING FOR MEN

1. **For Freshmen Excused from Drill.** Throughout the year. Three periods a week. Class and squad work and prescribed exercises. Mr. O'CONNELL and assistants.
2. **For Sophomores Excused from Drill.** Throughout the year. Three periods a week. Class and squad work and prescribed exercises. Mr. O'CONNELL and assistants.
3. **For Juniors and Seniors.** Building up and corrective exercises as prescribed by the Medical Examiners as a result of the physical examination required of all students in the University. Mr. ALLEN.
4. **Boxing, Wrestling, and Fencing.** Instruction 3-6 daily except Saturday. Mr. FALLON, Mr. O'CONNELL, and Mr. BERUMEN.

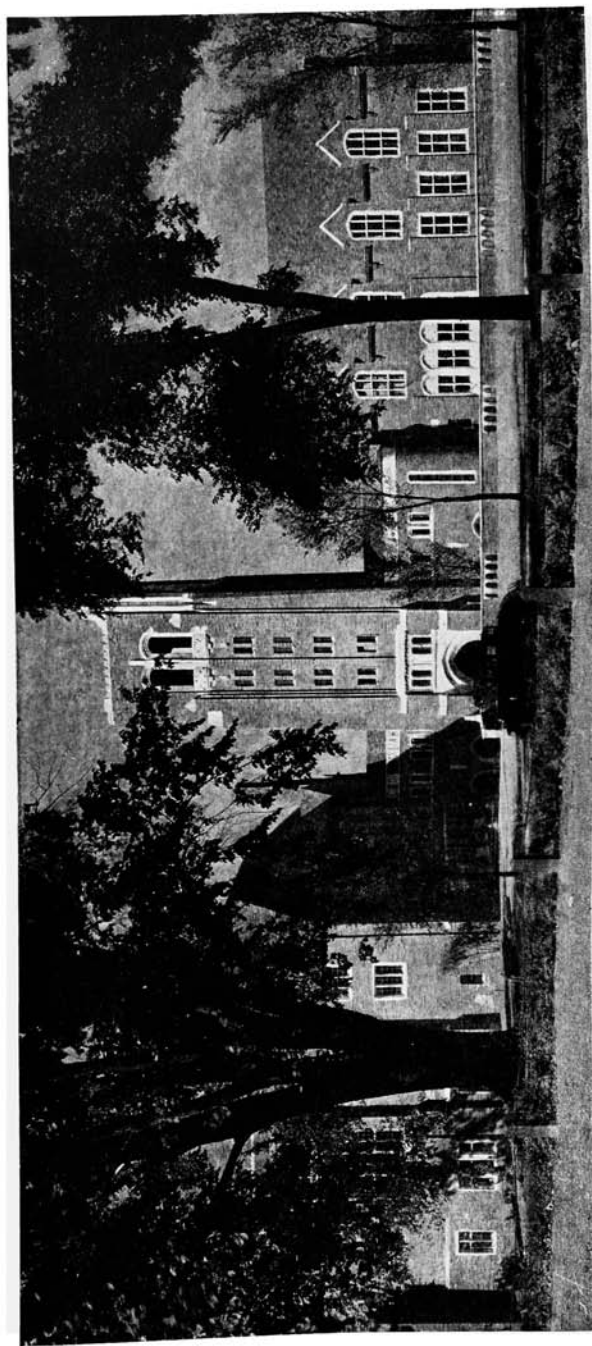
### PHYSICAL EDUCATION FOR WOMEN

6. **Physical Education for Women (Freshmen).** Throughout the year. Three periods a week. Misses BATEMAN, CAMDEN, CANFIELD, HASKELL, RYAN, and THORIN.
7. **Physical Education for Women (Sophomores).** Throughout the year. Three periods a week. Misses BATEMAN, CAMDEN, CANFIELD, HASKELL, RYAN, and THORIN.

The program consists of: six weeks of outdoor sports in fall and spring; indoor classes in gymnastics, folk and natural dancing, apparatus, games, swimming, fencing, and corrective exercises.

For further information as to the required work in physical education, see the handbook issued by the department.





MYRON TAYLOR HALL